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THE

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Edited by M. R. D. SEAWARD, M.Sc., Ph.D., F.L.S., The University, Bradford

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THE NATURALISTS' YORKSHIRE

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DR JOHN DOUGLAS PICKUP (1915–1977)

I first met Douglas Pickup on the colliery spoil-heaps at Fairburn in 1955, and later that year he spent a day at Spurn where Ralph Chislett and I were staying at the time. (He subsequently joined the Union the same year.) He never forgot, and frequently recounted, his first impressions of Spurn and the new birds he encountered that day. Fairburn, Spurn, birds and the Union continued to be among his main interests, and we became firm friends.

Douglas was born in Bradford, son of a Methodist minister, and remained a staunch member of the Church throughout his life. I am not sure to what extent this early upbringing in the Manse helped to shape his outlook and personality. His outstanding qualities always appeared to be an inherent part of him. The word I have most frequently heard

applied to Douglas has been that he was "genuine". He showed understanding and gentleness, and an infinite capacity for caring, both about people and causes. These qualities not only admirably fitted him to be a consultant paediatrician (he was at Pontefract General Infirmary for 25 years) but also caused members of the Union who came into contact with Douglas to regard him not so much as a fellow-member but rather as a valued friend. He communicated easily with both expert and beginner. Although intolerant of incompetence and inefficiency, especially in officialdom, no difference of opinion was ever allowed to affect his personal relationships. He was generous in assigning credit and giving praise.

A frequent attender at field meetings, he attached great importance both to getting to know new areas and to working alongside naturalists from other sections of the Union rather than within the confines of his own specialisation. Though primarily interested in birds, he was also punctilious in submitting records for other orders. He held the offices of chairman of the Vertebrate Section, and of the Executive of the Union. In 1976, the year in which he retired, he had the distinction of being elected President not only of the Union but also of the Yorkshire Naturalists' Trust. It is a measure of the courage with which he faced up to the restraints inflicted on him by illness and a major operation in January of last year that he continued to attend meetings of the Union and the R.S.P.B. Council, and to chair those of the Fairburn Advisory Committee and the Council of the Y.N.T. almost up to the time of his death on 27th August, 1977. He had tackled these onerous duties, especially those associated with the Trust Presidency, with characteristic enthusiasm and thoroughness.

His Presidential Address to the Union, published in the *Naturalist* (**102:** 41–48), provides a number of clues both to his character and his philosophy. It was a memorable occasion for those of us who heard him deliver it at the Beverley A.G.M. The attendances at that meeting and at his funeral service were indicative of the high regard and deep affection in which he was held.

The Union could ill-afford to lose so well-informed, devoted and hard-working a member. Our sympathy is extended to his widow and family to whom the loss is so much greater.

R. F. Dickens

Dr Douglas Pickup Memorial Fund

A number of friends of the late Dr Pickup of Pontefract have felt the need for some tangible tribute to his memory, and accordingly have opened a special Dr Douglas Pickup Memorial Fund.

In view of Douglas's close association with the Fairburn Ings Nature Reserve and Bird Sanctuary, for which he worked so hard and where he spent so many happy hours, it seems fitting that money donated to the fund should be devoted to a suitably appropriate project on the Fairburn Reserve and should be connected in some way with Dr Pickup's particular interests; his family have expressed their agreement, and the Royal Society for the Protection of Birds warmly welcomed this idea. Money already donated to the Society will be added to the Memorial Fund.

Donations, made payable to the

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LEEDS 1

THE STATUS OF BLACK GROUSE IN THE PEAK DISTRICT

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INTRODUCTION

The Black Grouse *Lyrurus tetrix* is a bird which used to occur quite widely throughout Britain but which has disappeared from southern and eastern counties of England. It therefore has now a northern and western distribution resembling that of many other birds such as Red Grouse *Lagopus lagopus* and Golden Plover *Pluvialis apricaria.* A very few pairs survive in Devon and Somerset, it is more plentiful in Wales, and occurs in the Peak District, but is most numerous further north in England, and in Scotland (Sharrock, 1976). Parslow (1965) notes that in central and northern England the species seems to have decreased generally in the decade following the 1939–1945 war, but that there have also been both local decreases and increases more recently. The Peak District population is an isolated one, and seemingly declining, but there has been no previous attempt to estimate the size of the population. The fact that the population is split between three or four counties, each with their own bird reports, does not make an assessment of the overall population any easier. This report attempts to rectify the situation; it is based in part on a survey of the literature and contacts with as many local ornithologists as possible (by D.W.Y.) but especially on extensive fieldwork in north Staffordshire during 1973–1975 (by G.A.L. and M.W.).

METHODS

The basic information for this paper was obtained during 11 early-morning and 19 evening sorties in 1973, eight early-morning and seven evening visits in 1974, and four morning and five evening sorties in 1975 (field work in 1974 and 1975 was curtailed by the petrol shortage). These sorties resulted in a total of 71 "lek-visits" in the early morning and 40 evening "lek-visits" (table 1). All Black Grouse were counted, but it is well known that hens visit the leks less than the cocks (Kruijt & Hogan 1967); population estimation is therefore based on the counts of cocks. The sparse population in Derbyshire has been under scrutiny by various ornithologists, and information on these has been gathered from them and from the annual reports of the Derbyshire Ornithological Society (D.O.S.). The situation in Cheshire is less certain, but the annual Cheshire Bird Reports (C.B.R.) contain some information. Some information is available for all counties from county bird books back to the turn of the century, and this is used to set the current status of the species in each county in its historical perspective.

CHESHIRE

Coward and Oldham (1900, 1910) mentioned a number of historical records from the Cheshire Plain, but considered the species to be breeding then only in the hills of the east. It was fairly plentiful in the woods of the Goyt Valley from Whaley Bridge to Goyts Moss (now Derbyshire), in the wooded cloughs between Sutton and Bosley, on Bosley Cloud, and along the Dane Valley between Bosley and Wincle. A few nested at Lyme Park and the neighbouring Bakestonedale Moor, and there was a report of nesting at Hollingworth, but it was believed to be absent from upper Longdendale. It was apparently quite numerous on Bosley Cloud in 1936 (Smith, 1937). However Bell (1962) concluded that it was by then not known around Wincle, and of Coward and Oldham's localities, only the Goyt Valley was producing

regular sightings. The, then, new woodlands of Macclesfield Forest had produced occasional reports (1955 and 1959), and Bell felt that it might be resident, but these records were outside the breeding season. Later, Bell (1967) reported that Black Grouse had bred on Danes Moss (south of Macclesfield, and six kilometres west of the Peak District in 1960, and been present there up to 1962. Macclesfield Forest and Lyme Park also produced further records, but again outside the breeding season.

More recently, there have been sightings at Lyme Park (1969, C.B.R.; 14th March 1971 and 24th October 1971 Mrs A. Shaw), at Macclesfield Forest (20th April 1971, C.B.R.; 8th April 1972 M. Marsland), in the Dane Valley (12th April 1974, C.B.R.) and in Upper Wildboarclough (6th June 1969, 16th April 1971 and 13th June 1973, C.B.R. and R. R. Jackson). Most of these reports concern one or two birds, though there were seven cocks together on 13th June 1973 in Wildboarclough. All of these reports come from areas close to known breeding sites in Derbyshire and Staffordshire, and most of them, including the record of seven cocks together, are outside the usual lekking seasons. Indeed, there is at present no known lek site in Cheshire, and apparently no proven breeding record since the 1960 occurrence on Danes Moss. It is possible that this results from rather poorer coverage by bird watchers than in the neighbouring counties, but it is also true that the available habitat seems poor in comparison. Indeed, Danes Moss, now a Cheshire Naturalists Trust Nature Reserve, is probably the best piece of habitat, and is well-watched.

Table 1. Results of counts at Staffordshire leks, 1973–1975 (G.A.L. & M.W.)

Lek	Number of counts			Number of cocks counted				Highest
Site	a.m.	p.m.	total	Highest	Total	Mean	Best Estimate	Hen Count
A	15	7	22	9	139	6.3	12 (A–B)	4
B	3	1	4	5	10	2.5		4
C	9	3	12	9	77	5.9	12 (C–D)	1
D	10	3	13	3	9	0.8		1
E	6	6	12	6	22	2.4	1	5
F	8	6	14	10	80	5.7	13 (F–G)	4
G	3	3	6	6	24	4.0		6
H	5	3	8	4	18	2.0	4	3
I	4	0	4	1	2	0.5	1	3
J	4	1	5	3	9	2.3	3	0
K	3	3	6	3	12	1.7	3	0
L	1	3	4	2	3	0.8	2	1
M	0	1	1	4	4	4.0	4	1
Total	71	40	111	65	409	38.9	55	33

DERBYSHIRE

Whitlock (1893) regarded the Black Grouse as local and not common in Derbyshire, and reported it to be breeding near Glossop, Hayfield, Castleton and Strines, and in the High Peak with a few further south in the Chatsworth area. Bryden (1907) reported bags of 13 in 1903 and three in 1904 on the Chatsworth estate, but predicted its extinction within 50 years. Smith (1974) reported a population in 1930 of 12–25 pairs between Owler Bar and Baslow,

and referred to breeding at White Edge in 1958, and Derwent Dale in the 1960's. A flock of *ca* 20 was seen in the Upper Derwent Valley in the late 1940's (A. Simpson), and Smith (1974) felt that there had been an increase post war in this area, before a more recent decline in the last decade. Certainly, there has been a well-documented decline over the last 15 years in Derbyshire. In the early 1960's the annual reports (D.O.S.) regularly mention sightings on the Eastern Moors, from such localities as Matlock Moor, Beeley Moor, Flash Dam, Big Moor, Barbrook, Abney, Longshaw and the Ladybower area, as well as from the Goyt Valley. Since 1967, however, only the Goyt Valley (including Hoo Moor) has produced regular records; there have been occasional records elsewhere in the Buxton area, on Kinder Scout (29th November 1969) and at Friden (13th May 1972) which probably refer to stragglers from the Goyt area or Staffordshire. In 1972, it was felt that the species only survived in the county in the Goyt area (D.O.S.).

There is no doubt that the decline is genuine, for ornithological coverage has improved during this period. P. Shooter recently attempted to quantify this decline by asking various correspondents to estimate the populations in 1963 and 1973. These estimates, recently amended by the same correspondents, suggest a population of 59–78 birds in 1963, spread between four areas (Matlock Moor, two–four birds; Longshaw two–four; Derwent Valley 15–20; Goyt Valley 40–50). In May 1973, eight cocks were seen in the Goyt Valley, suggesting a population of 16 birds, and this was thought to be the only population.

Subsequent information modifies this status somewhat. There is an unconfirmed report of breeding at Matlock Forest as late as 1971 (Shooter 1973), though no subsequent records. The recent Sheffield Bird Reports (1973, 1974) indicate a small surviving population of three–four birds in the Derwent Valley area, and subsequently five cocks and two hens were seen at a lek in 1975, and eight cocks and six hens in 1976 (D. Herringshaw); this appears to be a genuine increase. However, the Goyt Valley population may have declined further; five cocks were seen in May 1974, single cocks only in 1975, and up to three cocks in 1976 (G. Howe).

YORKSHIRE

There is little information on the past or present status of the Black Grouse along the Yorkshire edge of the Peak District. Smith (1974) referred to breeding in the Strines area in 1948 and again in the late 1960's (though this last record is perhaps suspect). Leks were known in the area in the 1940's and 1950's (D. Herringshaw); an isolated sighting in 1975 of a single cock is the only indication that the species might still occur. The available habitat seems good, however, and the species may well still breed.

STAFFORDSHIRE

Smith (1937) quoted Plot (1686) as saying that Black Grouse were more numerous than Red Grouse in Staffordshire during the seventeenth century, but this was certainly not true by the nineteenth century. In 1925 (Masefield & Smith 1925), the species was still quite numerous on the moors north of a line drawn E-W through Leek, and daily shooting bags of 15–20 were still being made. However, no precise information on the status or distribution on the northern moors was given in their note, which was mainly concerned with the substantial decline that had occurred further south in the county. On Cannock Chase, for example, the record British game bag for a day's shooting of 252 was obtained in about 1860; in 1897, the best bag was 41, and in 1898, 40. By 1924, only a single pair was seen. By 1935, it was evidently found only in the area of Swineholes Wood, S. E. of Leek, and on the moors to the north of Leek, i.e. within the Peak District (Smith, 1937). In 1937, 20 were seen together near Warslow Hall (7th March 1937, G.A.L.) and there were scattered records in many of the areas where Black Grouse can still be seen. Lord and Munns (1970) reported virtually the same distribution as Smith and considered that the population had remained fairly static in post war years. They mentioned that 18 cocks and four hens had been counted at one lek in 1964, and estimated a Staffordshire population of between 60 and 100 birds. Such a

Figure 1. Distribution of Black Grouse in the Peak District. Solid lines enclose surviving populations and the number of cocks in each in 1973; broken lines enclose the extinct populations and the date of extinction. Circles indicate isolated sightings elsewhere since 1970. The heavy dashed line is the outline of the Peak District National Park, the dotted lines are (1973) county boundaries, and the grid is the 10 km National Grid.

population could not sustain daily bags of 15–20, and this must represent a numerical decline since 1925.

In April 1971, G. Finikin counted at seven leks, and recorded a total of 38 cocks; on the assumption of an equal sex ratio, this implied a population of about 80 birds. The counts in 1973 and 1974 yielded, of course, rather variable results. At the largest lek, for example, the highest count was ten cocks (5th February 1974) and the lowest three (19th March 1974, 20th March 1974) but the average on 14 visits was 5.7 cocks. In all, 13 leks in Staffordshire were visited, and if one adds the highest count at each of them, the total suggested is 65 cocks. However, some movement certainly occurs between leks, particularly the smaller ones, and a slightly more modest "best estimate" of 55 cocks is obtained by trying to allow for this. If one takes a mean count for each lek site (total number of cocks seen at a lek divided by number of visits) and summates these, the total suggested is 38.9 cocks, but this is clearly an underestimate; short visits to a number of lek sites during a sortie will obviously not always find all of the cocks present.

If one makes the assumption of an even sex ratio, the best estimate of 56 cocks in Staffordshire implies a total population in spring of 100–120 birds. This is somewhat higher than other recent estimates, and might be taken to suggest a modest increase in the population. The "highest count" from the seven leks that G. Finikin had visited in 1971 was 42, also suggesting a modest increase. However, the coverage during the present survey was more thorough than any previously available and, indeed, discovered four new lek sites. A better comparison with G. Finikin's 1971 count of 38 cocks might be the "best estimate" figure of 36 cocks or even (since he was only able to make one or two counts at each lek) the "mean estimate" of 25 cocks; these figures might suggest a modest decline. It seems safer to conclude, in agreement with Lord and Munns (1970), that the Staffordshire population is reasonably stable at present.

Total Population

The most reliable indicator of the Black Grouse population is the count of cocks at the lek sites. These suggest perhaps ten cocks in Derbyshire and 56 in Staffordshire, or 66 in the whole area (fig. 1). One Staffordshire lek (of just two cocks) is about three kilometres south-west of the Peak District, and another just on the boundary of the National Park; essentially, therefore, the population in this area is the population of the National Park. Conventionally, the total population has been estimated by assuming an even sex-ratio; Joensen (1967) suggests on Danish populations that this is reasonable. (Actual counts of hens are generally much lower than counts of cocks (65♂♂ 33♀♀ in this survey) but this is because hens only visit the leks for a short period of the breeding season, perhaps over three weeks from mid-April (Kruijt and Hogan 1967) and only remain at the lek for, on average, 50 minutes.) On this basis, the spring (breeding) population of the Peak District is about 130 birds. However, Wiley (1974) notes that one year-old males in polygynous grouse do not mate, though females do, and that they may not attend the lek sites until late in the breeding season, if at all. In this case, the population should be biased, perhaps 1.3:1, in favour of the hens, and the total population estimated from a count of cocks should be somewhat higher, perhaps up to 150 birds. Joensen (1967) considers that the autumn population would be about twice the spring population, i.e. 250–300 birds.

Discussion

Even at this highest estimate of the population, it is clear that the Black Grouse is a scarce species in the Peak District. Furthermore, it is clear that there has been a drastic decline during the last 15 years in both numbers and distribution. The population ought to be monitored for further declines and if possible, the species deserves some conservation measures. These will not be possible, however, without some indication of the causes of decline. The remainder of this paper therefore examines the habitat of the Black Grouse in the Peak District and considers possible changes which may have caused the decline.

Habitat — The habitat of the Black Grouse is a complex one, and seems to require a combination of three vegetation types, woodland, heath and pasture (table 3).

Woodland is generally present, but the bird is clearly not a woodland bird so much as one of the woodland edge; indeed, Joensen (1967) considers the main cause of its decline in Denmark (from 2400 in the 1940's to 1100 in the 1960's) is the spread (largely natural) of pine *(Pinus mugo)* over its former heathland habitat. The species often perches in trees, but the main function of woodland seems to be the provision of winter food. The damage it may do to pine *(Pinus sylvestris, P. contorta)* seedlings is well known to foresters (Palmar, 1968), but it seems from Scandinavian work that pine provides very little of the food (Kaasa, 1959; Seiskari, 1962). Buds and especially catkins of birch *(Betula pubescens, B. pendula)* are, on the other hand, essential winter emergency food, occurring in 93% of crops analysed by Seiskari (1962) and contributing 77% of observations of feeding (table 2). This would fit with observations of large numbers (40–45 on 14th February 1970, 46 on 14th November 1970, D.W.Y.) seen together in the Dane Valley on or around birch scrub, especially during snowy weather. Since Black Grouse feed mainly from the ground (Johnstone 1967, Pauli 1974), birch scrub is probably more important than birch woodland. Spruce *(Picea abies, P. sitchensis)* is not much eaten by Black Grouse, and forestry plantations are generally unsuitable habitat, but larch *(Larix kaempferi, L. decidua)* buds and shoots are eaten and in Switzerland replace birch as the winter food (Zettel, 1974). The berries of rowan *(Sorbus aucuparia)* may also be important (Johnstone, 1967) and 20 were seen feeding on rowan berries on 14th November 1976 in the Dane Valley (D.W.Y.).

Calluna-dominated moorland is also an important feature of Black Grouse habitats. The shoots of the heather itself may provide a little food (Johnstone, 1967), but berries of associated plants (Bilberry, *Vaccinium myrtillus* and Crowberry, *Empetrum nigrum*) are the important autumn foods as are shoots of *Vaccinium* in summer (Kaasa, 1959). This longer vegetation also often provides the nest site, though long grass, as in young forestry plantations, may be used.

Pasture, often improved pasture or meadowland, is also present, and it is perhaps significant that all but one of the known lek sites are on short pasture (the exception being on

Table 2. Winter food of the Black Grouse in Finland (from Seiskari 1962). Analysis of crop contents and observations of birds feeding indicate the predominance of birch, especially from November to March. "Interseasonal foods" are the shoots and berries of shrubs such as bilberry.

Month	IX	X	XI	XII	I	II	III	IV	Total XI–III	% XI–III
No. of crops	24	14	5	9	18	12	2	2	46	
Birch	—	6	3	9	17	12	2	2	43	93.5
Alder	—	1	—	1	4	—	2	—	7	15.2
Pine	2	3	2	2	5	6	1	1	16	34.8
Interseasonal	24	13	4	2	2	2	2	1	12	26.1
No. of observations	55	67	104	79	93	97	80	74	453	
Birch	4	16	70	54	75	87	64	46	350	77.3
Alder	—	1	5	3	1	—	3	3	12	2.6
Pine	—	5	14	14	8	7	9	6	52	11.5
Interseasonal	51	35	15	8	8	3	4	19	38	8.4

rough *Molinia*-dominated grassland). These pastures are at their shortest during the lekking season, and perhaps their main asset is the good visibility, of neighbours and potential predators, which they allow. By late summer, the grass is quite long and on at least one Staffordshire site, cocks can be seen throughout the summer feeding in the pastures, apparently on the grass itself. At least at this site, the hens frequently nest in the meadows. One odd feature of all but three of the Staffordshire leks is that they are near a building of some sort, often a derelict barn.

Decline. The most striking features of the decline in the Peak District Black Grouse population are its recent occurrence (since 1960) and its geographical inequality (affecting Derbyshire markedly, but Staffordshire little or not at all). Any explanation of the decline must account for these two features. Among possible explanations are direct persecution,

Table 3. An arbitrary assessment of the habitat requirements of Black Grouse, with reference to Peak District sites (scored 5 (high) to 0; d = declined since 1945).

	N. Staffs.	Derwent	Goyt	Longshaw	Matlock Moor	Strines
General Habitat (open moorland with scrub)	5	2d	1d	3	1d	3
Summer Food (bilberry shoots)	5	1d	2d	1d	2	3
Autumn Food (berries)	5	1	2	1	2	4
Winter Emergency Food (birch)	4	1	2	3	2	3
Nest Cover (meadows, mature moor, young plantations)	5	1	2	1	1	3
Lek Sites (short pasture)	5	2d	2d	2	3	2

public disturbance, changes in land use such as afforestation or greater grazing pressure, and the possibility of subtle habitat changes which result from a combination of human activities. Such general factors as natural predation or climate seem unlikely to have affected the Black Grouse when the Red Grouse has remained so common, and seem particularly unlikely to explain the geographical inequality.

Direct persecution has often been quoted as a factor in the decline of the Goyt Valley population; it is reported that a sizeable population existed until a change of shooting tenancy resulted in a large bag of Black Grouse (18 brace) one autumn (1966), and few seen thereafter. It is not certain that this in fact occurred, but if it did, it is remarkable that the surviving population has not increased in the ten years or so since. Moreover, a flock of 18 was seen in October 1968 (D.O.S.). Further south, all the moors of Staffordshire are still shot for Red Grouse, but the Black Grouse are relatively so scarce that few if any are killed. A few Greyhen may be shot in error, but generally the rarity of the Black Grouse is well appreciated in the area, and it is protected as far as possible. A moorland fire on Big Moor (Longshaw area) at the height of the nesting season in 1959 certainly killed some hens, and may have hastened the end of that population. Recently, a more subtle form of direct persecution has become a distinct possibility. Many bird-watchers know the site of the

biggest lek, and it is evident from their track that this site is well visited. Blackcock are somewhat timid on the lek, and regular disturbance could perhaps disrupt their breeding (Zettel, 1974). Against this, most visits by bird-watchers are to the evening lek, which is evidently less important to the birds than the morning lek. Unless, therefore, such disturbance were to frighten the birds away completely, the damage done would be slight, and neighbouring leks could perhaps in any case absorb displaced birds.

Public disturbance is certainly a factor which has increased sharply since about 1970, and some parts of the Eastern Moors, especially the Longshaw area, are now subject to disturbance from people and, worse, their dogs. It is, however, by no means clear that this disturbance is particularly more serious in Derbyshire than Staffordshire; the area of The Roaches and Back Forest, for example, suffers at least as much as any Derbyshire location. Nor is it at all clear that public disturbance, which tends to be confined to roads and main footpaths, has actually been responsible for the decline in, say, the Goyt Valley; the areas where the Black Grouse occur are for the most part well away from the heavily frequented recreational locations. Much the same could be said for the Staffordshire colonies. At Longshaw, where recreational pressures are extreme, the Black Grouse had disappeared before the increase in leisure disturbance began. Such disturbance can almost certainly, then, be dismissed as a factor which has, so far, affected the species in the Peak District.

Afforestation is generally felt to be a factor favouring the Black Grouse in Britain; Parslow (1967) notes that its spread and increase in Wales appears to be related to the activity of the Forestry Commission, and Lord and Munns (1970) note with regret that there has been no such afforestation in Staffordshire. However, in three of the principle Derbyshire localities, Matlock Moor, the Derwent Valley and the Goyt Valley, there has been very considerable afforestation since the war, and there is now much more woodland in all three areas than in Staffordshire. It is clear that the development of woodland as such does not favour the Black Grouse, which accords with the opinion of Joensen (1967) regarding Danish populations. It remains possible that during the first two or three years of their existence, new forestry plantations do provide Black Grouse with new habitat, and produce local increases in population. This could occur either because there are young *Pinus*, short enough to be

Table 4. Sheep densities in moorland areas of the Peak District.

Moorland areas	Area (ha)	1965 Sheep	1965 Density/ha	1975 Sheep	1975 Density/ha
Staffs Moorlands	10772	10029	0.93	13627	1.27
Morridge	4492	4310	0.96	4096	0.91
Derwent	9959	16704	1.68	21537	2.16
Longshaw	1179	2763	2.34	4404	3.74
Hayfield	3960	6638	1.68	6026	1.52

Sheep statistics are derived from MAFF June census returns for the following parishes. The figure used is for total sheep, including lambs.

Staffs. Moorlands — Fawfieldhead, Heathylee. Leekfrith, Quarnford, Warslow & Elkstones, Hollinsclough.

Morridge — Butterton, Grindon, Onecote, Tittesworth.

Derwent — Derwent, Hope Woodlands.

Longshaw — Hathersage, Nether Padley.

Hayfield — Hayfield.

readily accessible as food (Johnstone, 1967), or because the young plantations, fenced against grazing, provide good nesting cover. A succession of new plantations available under an extensive afforestation programme could allow quite a large population to build up, and this might explain the increase post war and later decrease in the Ladybower area mentioned by Smith (1974). Alternatively, the growth of the trees may have replaced previously suitable birch scrub by unsuitable spruce; it is noteable that all the Staffordshire leks have birch scrub or woodland with older birch trees within two kilometres, and often within 200 metres. In all the Derbyshire sites birch is scarce, and it is more noticeable in the two areas where Black Grouse survive than at those where it has gone. However, Ramsley Moor has extensive birch scrub, but no Black Grouse.

The possibility that increased grazing pressure has affected Black Grouse numbers in the way that Red Grouse have apparently been affected (Yalden, 1972) merits examination. There is no doubt that sheep numbers on the Derbyshire moorlands have increased substantially since 1950; by 1968, their numbers were about doubled in all the areas (Kinder-Bleaklow, S.W. Moors, S.E. Moors of Yalden, 1972) which held Black Grouse. If, however, one is looking for a change that occurred after 1960, as did the decline in Black Grouse, the correlation is less certain. Figures for sheep numbers in the Staffordshire moorland parishes (table 4) support the view that sheep are less numerous there than in Derbyshire. Table 4 includes two sets of data for Staffordshire, one for the six moorland parishes which contain practically the whole of the Black Grouse population, and, for comparison, the neighbouring four parishes, which contain no lek sites. For Derbyshire, three sets of figures are given. Hayfield parish has not had a Black Grouse population in recent times, and serves as a basis of comparison. The Derwent area has had a declining population; even in 1965, it carried far more sheep than Staffordshire moors do then or now, and by 1975 supported sheep at a very high density, with less than 0.5 ha (1.2 acres) per sheep. The figure for the Lonshaw area, which has lost its Black Grouse, is also given, but is unfortunately suspect. The areas used to compute the sheep densities are the areas of civil parishes as measured from the one-inch Ordnance Survey maps. The sheep in the Longshaw parishes almost certainly graze also over the moorland of adjoining parishes.

If sheep are implicated in the decline of the Black Grouse, there are three probable reasons. One is that birch scrub is rather vulnerable to sheep grazing, another that bilberry is similarly vulnerable, the third that the general grazing pressure has removed the nesting cover, particularly in close proximity to the woodland. The removal of nest cover could well have been a factor in the Derwent Valley, where the slopes adjoining the woodland are now very tightly grazed. In the more distant past, sheep grazing has also been an important factor in Cheshire. Conversely the Staffordshire moors are floristically rich, with deep heather, luxuriant bilberry, and other berry-bearing plants also abundant.

More subtle changes in habitat are much less easy to specify, and clear correlations with the decline or survival of Black Grouse correspondingly less evident. One general point, however, which is evident in the field and from examination of maps, is the more simple habitat, now, of the Derbyshire sites, and the more complex nature of he Staffordshire moorlands. The fact that Black Grouse habitat includes birch woodland, moorland, and pasture has already been noted; in Staffordshire, these habitats exist in a tight mosaic, whereas in Derbyshire there are large blocks of one type of habitat adjoining large blocks of another. Moreover, examination of the 1930–1934 Land Utilization Maps shows that this mosaic was in existence then, and that the habitat in the Goyt Valley and in Derwent Dale was at that time very similar (Figs. 2 and 3). Since Pauli (1974) suggests that cocks feed and roost throughout the year within one km of the lek site, the habitat mosaic may be critical.

In summary, then, the apparent stability of the Staffordshire Black Grouse population in post war years has been associated with stability in the habitat. By contrast, the habitat in all the Derbyshire localities has changed drastically. Which changes have most affected the Black Grouse is less certain, but the declines in birch scrub and bilberry are perhaps the most important. In some localities, loss of local nesting habitat may also have been important (Derwent Dale); in others, the loss of open heathland or the replacement of the habitat mosaic by blocks of habitat may have been more critical (Goyt Valley, Matlock

Figure 2. The southwestern moorland of the Peak District, from the Goyt Valley in the north to the Staffordshire moorlands in the south. Left, the habitat in 1930–1934; Right, the same in 1973. Black, woodland and scrub; stipple, moorland and rough pasture; white, improved pasture and arable land. The gap in the moorland is the Dane Valley; south of this, the moorland — farmland mosaic has persisted, and ten of the leks now known are on the edge of this southern moorland. In the Goyt Valley, the habitat mosaic of the 1930's has been replaced by blocks of habitat. Two former lek sites have been covered by afforestation, and only one lek remains. (Habitat data based on the Land Utilization Survey 1930–1934 and a Nature Conservancy Council survey 1973).

Moor). Lastly, it seems possible that Black Grouse benefit locally in the early stages of afforestation, but are then displaced as the forest matures.

Thinking in terms of practical conservation, the best hope is that the habitat mosaic on the Staffordshire moorlands will persist. The designation of part of this area as an S.S.S.I. is partial recognition of its importance, but S.S.S.I. designation does not preclude agricultural changes, which would be the most likely, and most serious, type of change. Further, the S.S.S.I. only covers 18% (12 of 65♂♂) of the population. Continuing afforestation, in small patches, might provide new habitat, if this is important, but replacement of coniferous

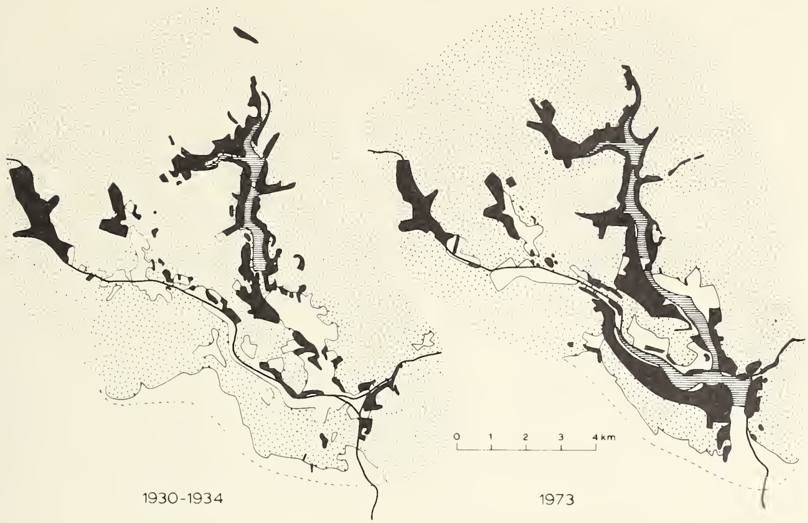

Figure 3. The Upper Derwent Valley. Left, habitat in 1930–1934. Right, the same in 1973 (symbols and sources as Fig. 1.). Here too, the former mosaic has been lost, and much deciduous woodland has been replaced by coniferous plantations.

plantations by birch scrub would be more likely to succeed (though impractical economically). The disturbance by bird-watchers could also be minimised by the provision of a viewing hide, though it is not clear either how practical this would be economically. Such provision might also minimise the increasing problem of bird-watchers trespassing over private land. As a step to popularise the natural history of the Peak District National Park, it is difficult to conceive of a more imaginative or challenging plan. Whether the R.S.P.B., Staffordshire Naturalists Trust, or Peak Park Planning Board could undertake it remains to be seen.

SUMMARY

The status of the Black Grouse in the Peak District this century has declined, until the species apparently no longer breeds in Cheshire; in Derbyshire there are perhaps only ten surviving cocks at two leks, but counts in Staffordshire in 1973–1975 found about 56 cocks at 13 leks. The decline has been associated with considerable habitat change in Derbyshire, and perhaps in Cheshire also, whereas the surviving population in Staffordshire exists on habitat which has changed little since before the war.

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We wish to thank the various ornithologists who have provided the data on which much of this paper is based. In particular, R. A. Frost, D. Herringshaw, G. Howe and P. Shooter have provided much of the information for Derbyshire. The debt to G. Finikin is great but cannot be repayed; had he lived, he would undoubtedly have rendered our work unnecessary. Discussion on habitat change has involved many people, but the help of J. B. Pendlebury with this aspect is much appreciated. We should like to thank the Nature Conservancy Council for information on current habitat information, provided through him, and for information on S.S.S.I.'s. A. Hamilton kindly assisted with translation.

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H. M. LIVENS LICHEN COLLECTION AT BOLTON MUSEUM

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Rev. Herbert Mann Livens, M.A. was born at Croydon on 24th September 1860. He was a church minister, and held appointments in Bolton (1892–1900), Hampshire and the Isle of Wight. He wrote a religious book entitled *Earth and her Children* (Livens, 1912), and contributed the section on mosses and lichens for the British Association handbook and guide to the Portsmouth meeting (Livens, 1911). Livens' data are also incorporated into the major papers on the lichens of the Isle of Wight by Wheldon (1909) and Knight (1933). He joined the Lichen Exchange Club of the British Isles in 1908. He had wide botanical interests, and through his field work he assembled a considerable number of bryophytes, lichens and flowering plants; the entire collection was donated to the Bolton Museum in 1945 during his 85th year. Further biographical details are wanting.

The lichen herbarium contains not only material collected by Livens and his family circle, but also that of the following well-known lichenologists:

Glover, J. (dates unknown)
Hartley, J. W. (1866–1939)
Hebden, T. (1849–1931)
Holmes, E. M. (1843–1930)
Horwood, A. R. (1879–1937)
Lillie, D. (dates unknown)
Morey, F. (1858–1925)
Parsons, H. F. (1846–1913)
Paulson, R. (1857–1935)
Reader, H. P. (1850–1929)
Rhodes, P. G. M. (1885–1934)
Tellam, R. V. (1826–1908)
Travis, W. G. (1877–1958)
Waddell, C. H. (1858–1919)
Watson, W. (1872–1960)
Weiss, F. E. (dates unknown)
West, W. (1848–1914)
Wheldon, J. A. (1862–1924)
Wilkinson, W. H. (?–1918)
Wilson, A. (1862–1949)

The collection is particularly strong in material from the New Forest and the Isle of Wight, but specimens collected from the following 47 vice-counties, mainly during the period 1903 to 1914, are also present: 1–6, 8–11, 15, 23, 29, 34, 39, 46, 48–50, 55, 59, 60, 62–65, 69–71, 73, 87, 88, 92, 96–100, 108, 109, 112; H1, 27, 38–40; C.

In all, 478 packets (454 British, 24 foreign) form the collection, the British material being represented by the following genera (the number of packets for each is given in parentheses); associates in the packets have also been named (and the date carded for the British Lichen Society's Distribution Maps Scheme), but not included in this analysis:

Acarospora (1)
Alectoria (9)
Anaptychia (2)
Arthonia (2)
Arthopyrenia (4)
Bacidia (4)
Baeomyces (2)
Buellia (5)
Calicium (3)
Caloplaca (12)
Candelaria (1)
Candelariella (1)
Catillaria (1)
Cetraria (2)
Chaenotheca (1)
Cladonia (59)

Collema (11)
Cornicularia (4)
Cyphelium (1)
Cystocoleus (1)
Demartocarpon (8)
Diploschistes (1)
Enterographa (2)
Evernia (5)
Graphina (1)
Graphis (2)
Haematomma (2)
Huilia (8)
Hypogymnia (7)
Icmadophila (1)
Lecania (1)
Lecanora (15)
Lecidea (12)
Lecidella (5)
Lepraria (3)
Leprocaulon (1)
Leptogium (7)
Lichina (5)
Lobaria (14)
Melaspilea (2)
Menegazzia (1)
Micarea (1)
Normandina (1)
Ochrolechia (5)
Opegrapha (6)
Pannaria (7)
Parmelia (38)
Parmeliella (1)
Peltigera (19)
Pertusaria (12)
Phaeographis (2)
Phlyctis (1)
Physcia (14)
Physconia (2)
Placynthium (1)
Platismatia (1)
Polychidium (1)
Protoblastenia (2)
Pseudevernia (3)
Pyrenula (3)
Racodium (2)
Ramalina (18)
Rhizocarpon (5)
Roccella (2)
Solenopsora (1)
Solorina (4)
Sphaerophorus (2)
Squamarina (4)
Stenocybe (2)
Stereocaulon (6)
Sticta (5)
Teloschistes (1)
Thamnolia (1)
Thelotrema (4)
Toninia (2)
Umbilicaria (12)
Usnea (16)
Verrucaria (11)
Xanthoria (7)

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ERGOTS ON RYE-GRASS *(LOLIUM PERENNE)* SOWN AS AMENITY GRASS IN BUILT-UP AREAS IN LEEDS

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There is much to be learnt about the natural history of Yorkshire cities, towns and housing areas as well as the countryside in which we most frequently hold our field meetings and fungal forays. Changes in the environment brought about by the massive development of roads and of new housing estates, as well as the planting of trees and grass in previously densely populated urban areas is currently providing much that could be of interest for naturalists of all ages. Fitter (1953), for example, has shown what can be done in London, one of the most densely populated places on earth.

Infections of grasses by the ascomycete fungus, *Claviceps purpurea*, are usually seen each year in all the Yorkshire Watsonian vice-counties (Mason and Grainger, 1936). As well as the grasses such as cocksfoot *(Dactylis glomerata)*, Yorkshire fog *(Holcus lanatus)* and *Nardus stricta*, which are commonly found infected each year near Leeds, the rye-grasses *(Lolium multiflorum*, Italian ryegrass, as well as *L. perenne*) are always the most severely affected in this area. For several years the occurrence of ergots in the inflorescences of rye-grass *(L. perenne)* have been conspicuous on the housing estates built at Bramhope, near Leeds, after the Second World War.

A readable account of ergots and ergotism is given in Ramsbottom (1953), spiced with much historical detail. It maybe of interest to give a short account of the natural history of *Claviceps purpurea*. I quote the detail from Moore and Moore (1950): Small horn-shaped purplish-black bodies, with a white interior, called ergots develop in the grass inflorescences in early autumn, in place of some of the seeds. These eventually fall to the ground and remain there over winter. They germinate at about the time the grasses are in flower to produce the tiny flesh coloured fruiting bodies which look like miniature drum sticks. The spherical heads of these bodies contain flask-shaped perithecia from which the ascospores are discharged. The ascospores are carried to the open or nearly open grass flowers by the wind or insects, and infect the developing ovaries by way of the stigmas. The extent to which the disease occurs is closely bound up with the weather conditions during the flowering period: probably about a week or 10 days of wet, cool weather during the flowering period giving most ergots by the autumn.

During the autumn and spring of 1972/3, all the road-side grass plots in a built-up surburban area at Bramhope, 3 miles in radius, were systematically surveyed for *L. perenne* inflorescences with ergots. Ergots were found on perennial rye-grass heads in grass in some plots in every road on three housing developments. The seed mixtures had been sown approximately 9, 14 and 20 years previously. No *L. perenne* or ergots were found on small areas of grass verge, usually with a very mixed flora, in various parts of the original old village of Bramhope, nor on an extensive development of small bungalows and houses built during the First World War, more than 60 years ago.

The results of this small survey indicate clearly that the presence of ergots in this area of amenity grass in a year with suitable weather at flowering time is closely related to the efficiency of mowing the grass. Some house owners mow the grass in front of their houses frequently and well. At the other extreme, for various reasons the grass may not be cut at all. (A walk round any relatively new housing development reveals a similar pattern). In addition to these *"well-mown"* and *"completely neglected"* grass verges, we find, of course, intermediate degrees of mowing efficiency. Rye-grass heads are always troublesome in

amenity grass, and are often removed by cutting them off after mowing, for example, with shears. Depending on the type of mower, and the hard work of the householder, one can find areas of roadside grass in which rye-grass heads persist, sometimes quite densely, after mowing. Good examples of these *"badly, but frequently, mown"* grass areas were found with ergots in the rye-grass inflorescences. One other class could be defined in the survey, on corners where an area of grass is (as it were), shared by several houses, or is remote from the fronts of houses. These *"occasionally mown"* areas are often only cut once a year or less, and then not very well. The largest numbers of ergots were found at this type of site. Thus, apart from the finding of some *L. perenne* inflorescences with ergots in grass all roads in the new housing areas it was possible to classify 28 well separated sites with ergots on this grass into

Table 1. Classification of roadside sites with *Lolium perenne* infected with *Claviceps purpurea* in a suburb of Leeds, 1972/3

Category	*Notes*	*No. of sites with > 1 rye-grass heads with ergots per sq. metre*
I "Well mown"	No persisting rye-grass heads	0
II "Complete neglect"	Seed sown when area "developed" then neglected	3*
III "Occasionally mown"	Many rye-grass heads. Often at a road junction	18*
IV "Badley, but frequently, mown"	Rye-grass heads persist, because of faulty mowing or mower	7

*The most severe infections had occurred in categories II and III, with a maximum of 157 inflorescences with ergots per sq. metre at one site in category II.

4 categories as shown in Table I. (Perhaps it should be repeated that more than half of the grass plots examined were *"well mown"*, and had no sign of *L. perenne* inflorescences, or ergots).

Four other sites where *L. perenne* had been sown during building developments at Leeds University 7 years ago (*"occasionally mown"* category) were noted as showing many infected heads in March 1973. Ergot infected rye-grass was also quite readily found at several sites in the centre of Leeds City alongside fences marking the edges of new road developments. (This part of grassed banks cannot be reached by a mower and hence is a *"complete neglect"* area.)

Rye-grass has long been known to be very highly susceptible to infection by *C. purpurea*, though it seems that the presence and extent of ergot production in this grass, in the considerable areas of housing and roadside verges "developed" in the last 3 decades in the U.K., has not been studied.

The risk of this infection of amenity grass being a potential source of disease in nearby grass on frams, or cereal crops, is very difficult to assess. It seems uncertain how much cereal crops, in particular, are menaced by grass ergots (Moore and Moore, 1950). Forms of the fungus on black grass *Alopercurus myosuroides* infect wheat (Carr, 1971). There is however a prevailing body of opinion that there is little host specificity among isolates from grasses and cereals (O'Rourke, 1976).

Cases of severe poisoning of horses, cows and sheep by grass ergots are very rare. It would be unwise to form any rapid conclusions about the potential risk crops, man or his animals, from ergots in suburban areas, especially as assays for the toxin content of the ergots recorded as present in this survey were not made.

We may note however that:

(i) Ergots are some of the most poisonous naturally occurring objects of our countryside and (it is clear from this survey) of some suburbs. From time to time, ergots, which have been accidentally eaten, have caused serious symptoms in cattle, horses, sheep and man. (I have come across no record of effects on cats or dogs.) Ergots must of course not be eaten. Very small children, or passing browsing horses, would seem to be the most likely to eat grasses with ergots in suburban areas. The potential risk to the health of small children or animals (whilst it exists) is very slight.

(ii) Cross-infection with grasses and cereals occurs with some forms of the fungus. Unmown built-up area grass road verges, and grassed down areas must be potential sources of infection for nearby farm grass and cereals under certain circumstances of location and weather conditions at flowering time.

(iii) Control of this fungus, and hence of the production of ergots could be achieved in two ways. (a) By not using rye-grasses in seeds mixtures on housing estates and new road sides and (b) when it is used in such areas the grass should be mown so that it does not flower, or controlled with herbicide alongside fences or places which cannot be mown.

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A FORM OF *VENTURIA INAEQUALIS* NEW TO BRITAIN ON *SORBUS LATIFOLIA* AGG. AT FILEY, YORKSHIRE

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During August 1966, a severe attack of the conidial stage of a disease resembling apple scab caused by *Venturia inaequalis* (Cke.) Wint. was observed on the leaves of several trees of *Sorbus latifolia* agg. (probably close to *S. devoniensis* E. F. Warburg) growing in a small public ornamental garden off Crescent Hill, at the south-east end of the sea front at Filey, Yorkshire.

During subsequent years (1967, 1968 and 1969) conidial pustules were again seen in August on wood, leaves and fruits of these *Sorbus* trees. Visits were made in May 1968 and

May 1969 and the perfect, ascigerous, stage collected in overwintering leaves on nearby grass and pathways. A quantity of leaves bearing the conidial stage, collected in August 1969, was kept in wire netting frames on concrete slabs in the University Agricultural Botany Garden in Leeds. These produced very abundant perithecia and ascospores in the months of April and May 1970. We measured the conidia, ascospores and perithecia and compared these with similar measurements of *Venturia inaequalis* collected on Bramley's Seedling apple leaves at Rothamsted Manor, Harpenden, Herts. in 1963. The conidia on the *Sorbus* are much shorter in length and the perithecia of the fungus on this host are somewhat smaller than those of *Venturia inaequalis* (Table 1). The fungi were otherwise morphologically indistinguishable from each other.

Table 1. Measurements* of *Venturia inaequalis* and of a similar fungus from *Sorbus latifolia* in μm.

Fungus from Sorbus	*Venturia inaequalis*	
19(16–25) × 9(6–11)	32(28–40) – 8(7–10)	Conidia
90(53–165)	130(90–170)	Perithecia
14(12–16) × 6(5–6)	13(12–15) – 6(6–7)	Ascospores

*500 spores or perithecia measured in each case; the maximum and minimum values are given as well as the mean value.

In the spring of 1970, we cross-inoculated whole leafy plants in pots, in the open air, with dense suspensions of conidia, and also of ascospores, obtained from various sources as indicated in Table 2. The conidia were obtained by washing infected leaves with distilled water; the ascospores by allowing their discharge from mats of leaves held round the pots in wire netting (Preece, 1964). The presence of ascospores and conidia on the leaves of inoculated plants was checked microscopically (Preece, 1959). The test plants were *S. latifolia*, *S. aucuparia*, small trees of apple cvs. Bramley's Seedling and Cox's Orange Pippin, as well as rooted cuttings of a scab-susceptible apple root stock, Malling Merton 109. The test plants (4 of each kind) had been prepared by growing them in the open at the

Table 2. Cross-infection experiments with a *Venturia* from *Sorbus* and *V. inaequalis* from apple.

	Cox's orange Pippin	Bramley's seedling	MM 109 rootstock	*S. aucuparia*	*S. latifolia*
Ascospores from Filey *S. latifolia* agg.	–	–	–	–	+*
Ascospores from Bramley's Seedling apple (Harpenden)	+	+	+	–	–*
Conidia from James Grieve apple (Bramhope)	+	+	+	–	–
Conidia from Filey *S. latifolia* agg.	–	–	–	–	+

* + = visible scab lesions produced by 30th July after inoculation on 1st May; – = no infection.

University Agricultural Botany Garden. The results, as seen by the development of scab pustules producing conidia up to 30th July 1970, were quite clear cut (Table 2). The *Venturia* on *S. latifolia* agg. at Filey did not infect *S. aucuparia*, Bramley's Seedling apple, Cox's Orange Pippin apple, nor the MM 109 scab susceptible rootstock. It is neither *Venturia inaequalis* (Cke.) Wint. nor *V. aucupariae.* It seems that the form on *S. latifolia* agg. is either a distinct species, which we are reluctant to define at this stage in the development of the taxonomy of *Venturia*, or is a *forma speciales*, which we prefer to call it, of *V. inaequalis* (Cke.) Wint., on *S. latifolia*. This view is supported by cross-infection experiments in which the Filey scab fungus failed to infect apple or mountain ash.

We did not culture the fungus on agar, and thus cannot compare the cultural characteristics of the fungus on *Sorbus* with other *Venturia* spp. as Herbst *et al.* (1937) did in their careful comparisons of *Venturia* spp. from apple, pear, mountain ash, *S. domestica*, hawthorn, cherry and birch. These authors stress the differences they observed using single-spore cultures, between *V. aucupariae*, *V. crataegi*, and *V. ditricha* (from birch), as well as the well known ones between *V. inaequalis* (apple) and *V. pirina* (pear). The conidial size, they record, is of specific value from the standpoint of taxonomy, and they report it is also a stable character. They record a form of *Venturia* in Germany on an *S. domestica* tree, the conidial measurements of which were very similar to those of *V. crataegi*. They suggest that the specific limits and specialisation of *V. aucupariae* and *V. crataegi* should be further investigated and defined more clearly. We endorse these comments, and suggest that taxonomic work with all known *Venturia* spp. and forms is called for to elucidate the situation adequately.

The occurrence of *Venturia* infections on *S. latifolia* agg. is new in Great Britain. At the same time it is very likely that this form has existed here for some considerable time, and the extreme genetical polymorphism of *Venturia* would lead one to suspect that variants of the fungus will from time to time become established on apparently new hosts.

Summary

A form of *Venturia inaequalis*, the apple scab fungus, infecting trees of *Sorbus latifolia* agg. at Filey, Yorkshire, was morphologically indistinguishable from *V. inaequalis*, other than in conidial length and perithecial size. Cross inoculation experiments with apple cultivars, *Sorbus* spp., and MM 109 scab susceptible apple rootstocks indicated that this is a distinct *forma specialis* affecting *S. latifolia* agg. which will neither infect apple nor mountain ash *(S. aucuparia)*.

Acknowledgments

We would like to thank: Mr. T. Wright who provided the small *Sorbus* trees and Mr. K. Redshaw who maintained all the test trees for us. Dr. R. Pawsey discussed our findings with us, and Dr. A. J. Richards kindly examined the Filey tree material and provisionally identified it for us. Dr. Colin Booth gave us helpful advice.

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ENTOMOLOGICAL SECTION MEETING AT ASKHAM BOG, 23rd JULY 1977

ROY CROSSLEY

This was the best attended field meeting to be held by the Entomological Section in recent years and it was, therefore, disappointing that rain forced us to abandon field work only two or three hours after starting. We were, however, delighted to enjoy splendid hospitality at the home of Mr. and. Mrs. Payne and entomological gossip carried on well after tea.

Recently there has been some gloom regarding the gradual disappearance of the former insect glories of Askham Bog as a result of changes in habitat. It was, therefore, heartening to see the management work now being undertaken on this famous reserve and we were pleased to have with us Mr. S. Warburton the Field Officer of the Yorkshire Naturalists' Trust to explain the aims of management and the achievements so far. All this augurs well for the future and the members present were unanimous in their agreement with what is being done.

Collecting was of necessity brought to an abrupt end by the bad weather but some interesting insects were reported. Of these the most important was a longhorn beetle, *Saperda populnea* (L.), which was one of the specialities of the Bog in former days. Many specimens of the beautiful chrysomelid beetle *Phyllobrotica quadrimaculata* (L.) were seen on skull-cap in one of the newly created clearings, here at its only known Yorkshire locality. The very local soldier beetle *Cantharis bicolor* Hbst. was also taken. Of the hemiptera the Askham Bog speciality *Capsus wagneri* Remane was found to be plentiful (males only) in its usual place, and *Calocoris fulvomaculatus* (DeGeer) was also seen. The hopper *Macropsis cerea* Germ. was taken from sallows. We are grateful to Dr. A. H. Fitter, Chairman of the Management Committee for permission to visit and collect at Askham Bog and full species lists, together with comments, will be deposited with the Committee in due course.

ENTOMOLOGICAL SECTION MEETING AT NORTH FERRIBY, 18th JUNE 1977

ROY CROSSLEY

The object of this meeting was to study the invertebrate fauna of several areas on the north bank of the Humber in grid square SE/9020 which are subject to tidal influences. We first explored a brackish pond about a quarter of a mile east of the foreshore car park. A tidal gutter drains a section of the reed beds at one side of the pond and here on the exposed mud at low tide were typical estuarine ground beetles such as *Bembidion iricolor* Bed., *B. varium* Ol., *B. minimum* Fab., and *Dicheirotrichus gustavi* Crotch. The local carabid *B. lunatum* Duft. was also present. Other beetles of note were the staphylinid *Quedius pallipes* Lucas, a species of south east England known elsewhere in Yorkshire only at Spurn, and the very local southern ladybird *Coccidula scutellata* Herbst. The *Phragmites* bed produced two local hoppers which are both at the northern edge of their range here, *Chloriona dorsata* Edw. and *Araeopus pulchellus* Curt. Two bugs of note were *Saldula pilosella* (Thoms.), known otherwise at Kilnsea and Thorne, and the water bug *Sigara stagnalis* (Leach), a typical species of salt marsh pools. Along the foreshore several woodlice were found under tidal refuse, including *Ligia oceanica*, *Trichoniscus pusillus*, *Androniscus dentiger* and *Platyarthrus hoffmannseggi*.

After lunch the river bank west of North Ferriby was explored and in the vertical bare cliffs were the tell-tale heaps of sand at the entrances to the tiny burrows of *Bledius* beetles. The colonies were extensive and the species involved proved to be exclusively *B. dissimilis* Er. which hitherto was known in Britain from a single locality near Bridlington. This is one of the most important entomological discoveries in the county in recent years. On the hard

packed mud along the shore at this point were the burrows of the beetle *Heterocerus maritimus* G. -M. which can typically be found in such situations.

Later in the afternoon a few of the party visited the extensive reed beds at Broomfleet Island by kind permission of the owners and the tenant farmers. Here we were pleased to find several specimens of the very local fenland ground beetle *Dromius longiceps* Dej. This species occurs widely in the reed beds in the R.S.P.B. reserve at Blacktoft Sands just upstream and across the river, and its occurrence at Broomfleet Island was to be expected. We had not, however, anticipated finding the tiny carabid *Microlestes maurus* Sturm in such good numbers for this is very local in Yorkshire, all the records so far being in V.C. 61. The reed beds produced further specimens of the small bright green hopper *Chloriona dorsata* Edw.; this species is recorded elsewhere in Britain from Spurn and three localities in southern England. A similar small green species *C. glaucescens* Fieb. was also found; this is only locally distributed in Britain, the other Yorkshire localities being Kilnsea and Fen Bog.

The following week Mr. C. A. Howes visited Broomfleet Island, and working upstream from where we had been, he found a varied spider fauna, of particular note being the salt marsh species *Xerolycosa miniata* and *Pardosa purbeckensis*.

Record cards have been completed in connection with the various invertebrate mapping schemes now operating and a full list of species recorded is to be deposited in the minutes of the Entomological Section. I am grateful to Messrs. W. Ely, J. H. Flint and C. A. Howes who submitted species lists and comments.

ADDITIONAL NOTES ON *TRUNCATELLINA* IN YORKSHIRE

A. NORRIS

Department of Natural History, Leeds City Museum

As a result of my publication on *Truncatellina cylindrica* (Férussac) in Yorkshire, *Naturalist* 101: 25–27, two further Yorkshire records of *Truncatellina* have come to my notice.

Four specimens have been located in the A. Smith collection, in Leicester Museum, labelled *Truncatellina cylindrica* = *Vertigo minutissima* collected at Scarborough in 1921. Vice-county 62, Yorkshire, North-east, a new vice-county record. This record has never been published or submitted for verification. The cliffs in the area of Scarborough may possibly have been a site for this species, as parts of them, particularly to the north of the town, do appear to be suitable. This species should therefore be looked for, particularly between Scarborough and Cloughton, in areas of old-established short sandy grassland.

The second record that has come to my notice concerns specimens in the Royal Scottish Museum, Edinburgh. (Acc. No. 1961–61. R.S.M.). The origin and authenticity of these specimens are very much open to question, but it seems desirable to note their occurrence. The label on the specimens reads as follows; *Truncatellina cylindrica* ssp. *britannica* Pils. (Fer.) England, Yorkshire, Mid-west 64, Ingleton, Reader Coll. det. A. R. W. 1971 ex. coll. A. E. Salisbury. Dr. A. Roger Waterston brought these specimens to my notice and they were subsequently examined by Dr. M. P. Kerney of Imperial College, London and myself. The specimens are typical *Truncatellina callicratis britannica* Pilsbry, a species known only from the south coast of England.

If these specimens did originate from Ingleton, then this record would be very important and rather surprising. The question must therefore be asked whether or not the record is genuine. Little is known about Reader and the extent and reliability of his collection but a great deal of doubt has previously been expressed about the reliability and authenticity of a number of specimens in the A. E. Salisbury collection. This must be taken into account when assessing this record. The record cannot be accepted without further evidence to substantiate it, but as in the case of most records of this type, it cannot be completely disregarded.

FIELD NOTE

An apparent hybrid *flava* wagtail in Yorkshire

At Hatfield Marina near Thorne a male blue-headed *flava* wagtail appeared on 1st May 1976. With its lavender blue crown and nape, and inconspicuous supercilium it resembled Sykes's Wagtail *Motacilla flava beema* rather than the Blue-headed Wagtail *M.f. flava*, which has a grey-blue crown and nape, a pronounced supercilium and darker ear-coverts, and which is the usual blue headed race seen in Britain. It was still present on the 2nd and was closely watched. There had obviously been an arrival of *flava* wagtails on or about 1st May, and on the 2nd *ca.* 15 were counted in one meadow, mostly male Yellow Wagtails *M.f. flavissima*, the British breeding race, but including the blue headed bird. Similar numbers were counted on the 3rd and a female Grey Wagtail *M. cinerea* was also located. The number of wagtails declined subsequently though the blue headed bird remained to at least 23rd July. It frequented the region around the marina, an area of arable fields, a meadow and hedgerows with scattered trees. It was also seen about the grassy marina banks, as well as the adjacent track. The wagtail was seen carrying food on the 3rd June and on a number of occasions subsequently. Besides feeding in typical wagtail manner in the meadow, it was observed to catch flying insects and also to feed by the water's edge. During its stay it was often seen in the company of a typical female *flavissima*, and at times was heard to sing from the fence surrounding the marina.

I observed the bird closely several times through 10×50 binoculars and made a full description, which has been accepted by the relevant authorities. The crown, nape and ear coverts were lavender blue, the bill was dark, as were the feathers in a line from the bill to the eye. The underparts were yellow, paling to whitish on the throat. The white supercilium was neither extensive nor particularly noticeable. It extended from midway between the nape and the eye, over the eye, and projected slightly in front. The greenish mantle seemed a shade darker than in *flavissima*.

The *flava* wagtails exhibit an evolutionary instability, and make up a species complex, comprising a number of races throughout the entire Palearctic range. The variation between races is most obvious in the head patterns and colours of the males in breeding plumage, although this is further complicated by extensive hybridisation and morphological simulation. Two of these races are especially relevant here. The Yellow Wagtail breeds in Britain, and in continental Europe from N.W. France into Norway. The Blue-headed Wagtail breeds occasionally in S.E. England, and in Europe from S. Scandinavia to central France and eastwards across the continent. Both of these sub-species hybridise in the narrow area of overlap in their respective ranges. The resultant hybrids resemble Sykes's Wagtail of S.E. Russia and W. Siberia, which typically has a lavender coloured crown, with or without a supercilium, but which is not on the British list. Wagtails in Britain resembling *beema* have been assigned to this hybrid status, and this latter seems to be a possible explanation for the plumage of the Hatfield bird. It served as a salutary reminder to those who saw it that any blue headed *flava* wagtail encountered should be critically examined and not just dismissed as a typical *flava*.

ACKNOWLEDGEMENTS

I would like to thank Mark Lynes and Mark Spence for allowing me to incorporate their observations.

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Martin Limbert

STRENSALL COMMON
AN APPEAL FOR HELP

Just over 100 acres at the northern extremity of Strensall Common have been put up for sale by the Ministry of Defence. The area includes the present 50-acre nature reserve leased by the Yorkshire Naturalists' Trust, together with two smaller areas lying between the railway and the road crossing the Common.

The Council of the Trust has unanimously agreed to purchase this enlarged Reserve at a cost of £7,500 because most of the characteristic plant and animal communities of the lowland Yorkshire heath are well represented, including many rare insect, spider and plant species.

Access to the rest of the Common is severely restricted by military activities, and the enlarged Reserve will encourage naturalists to visit its unique habitats in much greater safety. Naturalists need no reminder how important is the conservation of this area.

The Yorkshire Naturalists' Trust needs to raise £7,500.
Please give generously in response to this Appeal.

It would be of great help to the secretarial staff of the Trust if you would kindly use the form overleaf in making your response.

STRENSALL COMMON APPEAL 1978

To : The Executive Officer
The Yorkshire Naturalists' Trust Ltd.,
20 Castlegate,
York. YO1 1RP.

Please insert a tick in the appropriate square(s).

☐ I enclose a donation of £ .... in response to your Appeal.

☐ Please send me banker's order and covenant forms.

☐ I am prepared for my name to be published as a donor.

☐ Please treat this as an anonymous gift.

☐ I am prepared to organise a fund-raising event

☐ I am prepared to make an interest-free loan to the trust

Name ....

Address ....

....

....

Letter from the President to the Private Secretary to Her Majesty the Queen

YORKSHIRE NATURALISTS' UNION

9th December 1977

Dear Sir,

The members of the Yorkshire Naturalists' Union were welcomed to Pontefract by His Right Worshipful the Mayor of Wakefield, Councillor H. Claston, when they met recently for their Annual General Meeting.

Although funded in 1861, the Yorkshire Naturalists' Union did not adopt this title until 1877 and on this Centenary occasion it was the desire of all present to send loyal greetings to Her Majesty in her Silver Jubilee year, coupled with sincere good wishes for the future.

Yours faithfully,
(signed) Joan E. Duncan, *President*

REPLY

BUCKINGHAM PALACE

12th December 1977

Dear Mrs. Duncan,

Thank you for your letter of 9th December containing a message to The Queen from the Yorkshire Naturalists' Union.

I have laid this before Her Majesty, who greatly appreciated the kind message of loyal greetings which you sent on behalf of the members of the Union on the occasion of its Centenary. The Queen sends her warm congratulations to you all.

Yours sincerely,
(signed) Robert Fellowes

NOTES ON THE FOOD OF FOXES AT GIBRALTAR POINT, LINCOLNSHIRE

C. A. HOWES

Museum and Art Gallery, Doncaster

On 23rd and 24th October 1975, 111 fox *(Vulpes vulpes)* scats were collected at random from Gibaltar Point Nature Reserve, an area of coastal sand dunes between the Lincolnshire holiday resort of Skegness and the north eastern shore of the Wash. The condition of the scats ranged from very fresh to very weathered, representing the defaecation of the local fox population for many months and thus containing the remains of a wide spectrum of seasonal foods. Typically the scats had been deposited in open sites, often conspicuously on prominent objects and around the numerous rabbit *(Oryctolagus cuniculus)* workings.

Scat analysis, using the examination procedure in Howes (1974) revealed the following:

Frequency of occurrence in 111 Scats

Prey Item	(n)	%	Prey Item	(n)	%
Lagomorpha	98	88.2	Passeriformes	4	3.6
Clerithrionomys glareolus	11	9.9	Anseriformes	1	0.9
Microtus agrestis	5	4.5	Egg shell	3	3.7
Apodemus sp.	1	0.9	Crab	8	7.2
Rattus sp.	1	0.9	Fish vertebra	1	0.9
Phocidae	2	1.8	Wheat grains	1	0.9
Charadriiformes	9	8.1	Litter	10	9.0
			Ground beetles	1	0.9

It is not always possible to judge precisely from remains in fox scats how many, or more particularly, how much of any individual prey item was taken. It is therefore not possible by this method to calculate accurately the relative volume taken of each prey item. The above figures therefore merely indicate the number of scats in which traces of each prey item was present. When expressed as a percentage of the number of scats analysed these figures give some indication of the frequency with which the various prey items occurred in the diet of the foxes during the period of scat production. An interpretation of these percentage occurrence figures can help to throw light on the utilization of available prey types and therefore the feeding behaviour of the foxes.

The overwhelming bulk and frequency of lagomorph remains was possibly a reflection of the enormous rabbit population. Numerous and extensive rabbit warrens were distributed throughout the more mature dunes with burrow entrances pock-marking the fringes of the sea-buckthorn *(Hippophae rhamnoides)* thickets. Closely cropped rabbit 'lawns' were a conspicuous feature along many of the pathways and at the edges of the saltings between the dune systems where on 23/10/1975 over 30 rabbits were watched grazing along a 50 yard stretch of salting edge. Although the brown hare *(Lepus capensis)* could have formed part of the lagomorph prey, none were seen during the visit, and Clegg (1969) regarded the arable land to the west of the reserve as its stronghold. Bank voles *(Clethrionomys glareolus)* were probably caught amongst the dense sea-buckthorn jungles, where trapping by Clegg had shown them to be most numerous. The field voles *(Microtus agrestis)* were more probably taken from the marshland and rough pasture areas, where Clegg noted that short-eared owls *(Asio flammeus)* had been successfully hunting them.

Probably due to the availability of large numbers of rabbits, very little 'minor prey' was taken, these items occurring in 58 (52.2%) of the scats. This contrasted with findings at Spurn Peninsula on the east Yorkshire coast, when during 1975, a year when the rabbit population was relatively low, and the percentage occurrence of lagomorph remains was

down to almost half that at Gibraltar Point, non-lagomorph material, particularly *Microtus*, birds and marine invertebrates featured prominently in the diet (Howes in prep.). Of the minor prey items from the Gibraltar Point sample, at least 24 (41.3%) were of items which had almost certainly been scavenged. Evidence of litter, the debris of picnics left by the many holidaymakers who visit the area, was found in 13 scats — 22.4% of those containing minor prey items — (cellophane (3), silver paper (2), boiled sweet wrapper (1), choc-ice wrapper (1), fish and chips bag (1), tomato pips (1), tissue fruit wrapper (1), and egg shells (3)). This probably only represents a fraction of the true level of such scavenging as soft, easily digestible material, e.g. sandwich fillings, would not survive to be identified in scats. The egg shell remains were included in this category as they were judged to be from hard boiled chicken eggs found amongst picnic debris. Although foxes are said to raid the nests of shore nesting birds, no traces of any wild birds' eggs were detected. Strand-line scavenging, which seems to be an important component of foraging behaviour amongst coastal populations of foxes — particularly when live prey is unobtainable (Howes, in prep.) — was only detected from 11 scat batches (swimming crab, *Macropipus* sp. (8), fish vertebra (1) and the skin, fur and bone fragments of seal (2)) representing 18.9% of the batches containing 'minor prey' items. At 5,000 strong, the Wash population of common seals *(Phoca vitulina)* is the largest in Europe (Bonner and Witthames, 1974), consequently seal corpses are not infrequently washed ashore. Foxes are known to scavenge on seal carcases in Norway, where remains were found by Lund (1962) in 4 out of 447 fox stomachs, these being from animals which died in January (1) February (2) and March (1). Although not included amongst items scavenged, some charadriiform remains could have been from birds washed ashore — so frequently the case at Spurn (Howes, 1974). Beetles taken by foxes are often species associated with carrion and are thus indicators of scavenging. However, the ground beetle identified by P. Skidmore as *Agonum dorsale* — a species widespread in dry situations — is a predator of other invertebrates and was no doubt taken as a prey item in its own right.

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FIELD NOTES

***Erebia aethiops* Esp. (Scotch Argus): the Yorkshire localities**

The Scotch Argus butterfly has been recorded from four localities in Yorkshire; detailed notes for each follow:

(1) Grass Wood. The earliest record I have come across for this site is that given in the Rev. F. O. Morris's *A History of British Butterflies*, first edition, 1853, where he says ". . . in Yorkshire a few have been captured at the foot of Whernside in Craven and Mr. Allis tells me that it is to be found in plenty near Grassington in Wharfedale, also in Craven, on most of the hills and mountains of which district I fully expect that it will be discovered".

According to Mr. S. M. Jackson (Y.N.U. Recorder for Lepidoptera) the earliest record in the Y.N.U. archives is that for August 1882 on the occasion of a Union meeting. In *The Naturalist*, 1882–3, H. T. Soppitt (p.30) says: "A great number of *Erebia blandina* were taken in Upper Grass Wood, which is the only Yorkshire locality for this species". G. T. Porritt (p.31 of the same volume) says: "The very local *Erebia blandina* was flying in great

abundance on nearly all the grassy slopes in the High Grass Wood, and although hundreds must have been secured during the day, as many more might easily have been taken. Nearly all the specimens, too, were in splendid condition".

The entry under this species in Porritt's *List of Yorkshire Lepidoptera* of 1883 is as follows: "This northern species has long been known to occur in plenty at Grassington, in Upper Wharfedale, and on the occasion of the Yorkshire Naturalists' Union's visit there, on August 7th, 1882, was found to be as abundant as ever on the grassy slopes in the High Grass Wood; I took a beautiful series in splendid condition, as also did everyone else who wanted it". Thereafter, it was periodically reported. W. G. Clutten, of Burnley, said it was common in 1923, and apparently the last records were for 1927 when Clutten found it scarce. Mr. W. Reid reported seeing two around Dib Scar in August 1955, but this has not been confirmed. The only reference I have seen to its occurrence in the Low Grass Wood is in *The Naturalist* 1884–5, p.57, where J. W. Carter writing in Sept. 1884 says: "On the 10th August of the present year I had the pleasure, in company with my friend Mr. Soppitt, of making acquaintance with *E. Blandina*, in its well-known Yorkshire habitat at Grassington, in Upper Wharfedale. Several examples were noted in Grass Low Wood, close to the river; but in the High Wood they were to be seen sporting themselves in the sun, in open places, in countless numbers". The *Supplement* to Porritt's *List* (1903) says: "Still abundant at Grassington in 1903 (G.T.P.)". There is no mention here of any other locality.

The Lepidoptera of Yorkshire 1967, p.57, says: "Once abundant at Grassington (64), the race formerly occurring there must now be regarded as Extinct, and the species absent from the county. The last fully authenticated record from Grassington was in 1927 when W. G. Clutten found it "not uncommon".

(2) Buckden. In *The Naturalist* 1883, p.53, in a note chiefly devoted to the occurrence of *Larentia ruficinctata* in Yorkshire, the Rev. Trevor Basil Woodd, of Oughtershaw Hall, says: "I have also taken *Chortobius Davus* in this district, and *Erebia blandina* at Buckden". A footnote is appended by Porritt which says: "Mr. Woodd has very kindly sent me specimens of the above for inspection. The *Erebia blandina* and *Larentia ruficinctata* are well-marked specimens of the ordinary types; but the *C. Davus* are very curious . . . etc.". In the Appendix to Porritt's *List*, p.180, appears the following note: "*Erebia blandina*. Taken at Buckden, in Upper Wharfedale, by Mr. Trevor Basil Woodd, through whose kindness I have seen specimens". This locality is not mentioned in the Supplement of 1903.

(3) Whernside. Porritt's *List* of 1883 says: "Mr. Henry Denny also reports it from Whernside in Craven (*Mag. of Zoology and Botany*, 1837, i. 491), but there are no recent records of its occurrence there, possibly however because it has not been looked for".

Through the kindness of the Librarian of the Dept. of Entomology at the British Museum, I am able to quote the information given in *Mag. of Zoology and Botany* 1837 referred to above. This reads: "*Hipparchia blandina* — Five specimens were captured about the 21st August, 1836, at the foot of Whernside in Craven, Yorkshire, by Abraham Clapham, Esq., a pair of which were presented by him to the museum of the Leeds Phil. & Lit. Society, and one to myself — Henry Denny". According to Prof. R. D. Preston the contents of the former museum of the Leeds Philosophical and Literary Society were incorporated into the collections at the Leeds City Museum. This is thought to have taken place in the late 1920s. I am informed by Mr. Adrian Norris that the pair of specimens referred to above do not now appear to be in the museum collections. Mr. John Armitage, former Keeper, has no knowledge of them, either. The Rev. F. O. Morris *(loc. cit.)* also refers to a few specimens having been taken "at the foot of Whernside".

(4) Arncliffe. *The Naturalist* 1894, p.232 (Bibliography: Lepidoptera, 1892) has the following entry: "H. Wilde. *Erebia aethiops* at Arncliffe (Yorkshire, alt. about 1,000 feet; fairly abundant but in bad condition, 20th Aug. 1892; *Charaeas graminis* also fairly plentiful). *Ent.*, Oct. 1892, p. 244." *The Entomologist* Vol. 25 Oct. 1892, p. 244, has the following: "*Erebia aethiops* at Arncliffe. On August 20th, 1892, I found *Erebia aethiops*

fairly abundant in an opening in a wood at Arncliffe, Yorkshire, at a height of about 1000 feet. Most of them were in bad condition. The opening was covered with *Geranium sanguineum. Charaeas graminis* was also fairly plentiful upon ragwort *(Senecio jacobaea).* —— H. Wilde; Clay Hill House, Enfield, Sept. 15, 1892". I have seen no further reference to this locality in the literature.

Mr. Andrew Basil Woodd, of East Croydon, tells me that his great uncle left neither specimens nor notebooks which might help to pinpoint the Buckden locality.

I am greatly indebted to the following for information: Mr. Andrew Basil Woodd, East Croydon; Mr. Ben Nicholson, Otley, agent for the Oughtershaw Estate; Mr. and Mrs. A. Beresford, Oughtershaw; the Librarian of the Dept. of Entomology, British Museum and the Librarian of the Royal Entomological Society, London.

G. A. Shaw

Notes on the food and feeding mechanisms of a nightjar from Thorne

At 1.00 a.m. on the 6th September, 1977, a male nightjar *(Caprimulgus europaeus)* was killed by a car at the Thorne interchange of the M18 motorway (grid ref. 44/6714). The following day the badly damaged specimen was brought to Doncaster Museum where it was dissected and its stomach contents analysed. The firm bolus of food, weighing 7.8gm on removal from the stomach, was placed in water and the fragments of the prey items separated out.

Items removed intact were 27 noctuid moths and a crane fly (*Tipula paludosa* Meigen). A mass of partially digested lepidopteran remains was judged from the number of recognisable head capsules to represent a further 26 moths. Coleopteran remains, identified from a head, were from a dung beetle (*Aphodius rufipes* (L)). The presence of a moth — a Blood vein (*Timandra griseata* (Petersen)) — still in the oseophagus, suggested that the bird had been feeding at the time of death and that the 7.8gm of food, consisting of at least 56 prey items, represented the total evening's catch up to 1.00a.m.

Examination of the less well digested food items showed that prey had been taken whole and had not been dismembered, as is often the case with aerial feeding bats. Indeed, apart from a slight loss of scales, the blood vein moth was undamaged, having been introduced into the oesophagus head-first, no doubt facilitating easy passage to the stomach. Whether prey items are swallowed, regardless of position of projecting wings, legs etc., or whether the mouth of the nightjar is specially adapted to perform the function of arranging prey in readiness for being funnelled down the oesophagus, can only be resolved by experiment and anatomical investigation. The mouth of the specimen demonstrated the nightjar's high degree of specialisation for 'aerial plankton' feeding. The possession of a tremendously wide gape, used to engulf flying insects, and of stiff rictal bristles, which effectively enlarge its catching area and prevent the escape of prey from the sides of the mouth, are well known. However, closer examination of the enormous palate and buccopharyngeal region revealed two interesting features which could be related to the nightjar's effectiveness as a nocturnal aerial plankton feeder. Firstly, the gape lining was found to be membranous and highly elastic. This suggested that nightjars may 'pouch' prey in their elastic-sided mouths, rather as a bat 'pouches' flying prey in a bag formed by the cupping of the slack interfemoral membranes — a technique described by Whitaker (1907) and by several other observers (see Barrett-Hamilton 1910). This method would help to deaden the impact of flying prey and therefore lessen the likelihood of prey bouncing out of the mouth, particularly if entering at high velocity. Secondly, conspicuous purple striping of the gape, formed by a well developed system of blood vessels, showed the tissues to be highly vascular. Cowles (1967) suggested that a vascular palate lining would be highly sensitive and therefore easily stimulated by contact with an insect, thus enabling the bird to react quickly to prey while in flight. If this is so, it would suggest that the nightjar could hunt blind or partially so in very dark conditions, detecting prey by tactile means, responding by a rapid reflex triggered off by prey striking the sensitive palate membrane of the open mouth. Cowles (1967) found the features of the

soft and vascular palate lining to be common to those crepuscular and nocturnal caprimulgiform birds which hawk insects on the wing, e.g. the Red-necked nightjar *(Caprimulgus ruficollis)*, the Whip-poor-will *(C. vocifera)* and the Standard-winged nightjar *(Macrodipteryx longipennis)*. Interestingly, non aerial-feeding caprimulgids, which take food at low velocity and are better able to adjust food items in the beak prior to swallowing, e.g. the palm seed-eating Guacharo *(Steatornis caripensis)* and the Tawny frogmouth *(Podargus strigoides)* which takes an assortment of terrestrial prey items, lack the vascular specialisation of the aerial feeders and have hard insensitive palates.

The bird, plus gut contents, weighed a minimum of 105.3gm, but as this measurement was taken 7 days after death and after reassembly following post-mortem examination, there had no doubt been a substantial weight loss, therefore the figure is hardly valid as a representative pre-migratory weight. Dissection, however, revealed substantial deposits of fat, presumably accumulated in readiness for migration.

I would like to thank Mr. S. O. Johnson for making the specimen available for study, Mr. C. J. Devlin for carrying out the dissection and Mr. P. Skidmore for the insect identifications.

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C. A. Howes

Notes on the occurrence of *Succinea (Succinella) oblonga* Draparnaud 1801, in Yorkshire

Whilst examining the molluscan fauna occurring on the banks of the River Ouse, Mr. Brian Coles of the Department of Chemistry, York University, collected a series of examples of *Succinea* from Asselby Island on the 23rd April 1977, one of which proved to be *Succinea (Succinella) oblonga* Draparnaud 1801.

Succinea oblonga was first recorded in Yorkshire circa 1850 from Scarborough. The four specimens in the British Museum (Nat. Hist.) examined by Dr. M. P. Kerney, (pers. comm.), are thought to have been collected live. The card tablet, however, gives no details of date, precise locality or the name of the collector. In 1877 Mr. Robert M. Christy of Brighton found a single dead shell in the alluvial drift of the River Foss at Yearsley Lock, York. The specimen was examined and exhibited by Mr. John W. Taylor at the 47th meeting of the Conchological Society on the 31st July 1879 (*J. Conch.* **2**: 244), when a discussion took place between Mr. B. Holgate F.G.S. and Mr. Thomas W. Bell about its origins and it was decided then to record it as being of fossil origin. As a result of that decision, no examination of the banks of the Rivers Foss and Ouse took place in search of further examples. The only other record of this species is of a single live specimen collected by Mr. William Cash from the roots of rushes on Castle Hill, Scarborough on the 20th December 1898. This record was never confirmed, as the specimen was lost soon after it was found.

Asselby Island is a small promontory on the north bank of the River Ouse at its confluence with the River Aire, upstream of Boothferry Bridge, near Goole, Yorkshire, (GR: SE44/7226). The island is a low-lying area situated on the river side of raised flood banks. It is susceptible to occasional flooding, as suggested by the surface of the soft mud, which is dissected by water channels with bare soft mud sides. The vegetation is of willows with a few herbs and grasses, and the mud is strewn with stems of Himalayan Balsam *(Impatiens glandulifera)* and general wood debris. Patches of *Phragmites communis* and *Phalaris arundinacea* also occur in places. Samples of *Succinea* were taken from the east end (SE/725263) and the western end (SE/721267) of the island but, unfortunately, the two samples were not kept separately. Mr. Coles informs me, however, that he is reasonably

certain that the single *Succinea oblonga* was taken from the bare mud at the eastern end of the island.

Succinea oblonga is known from a wide variety of habitats in Britain. At Meathop in Lancashire, the nearest known locality, it occurs in damp patches on the floor of an old limestone quarry. At Ballantrae in Ayrshire it occurs under old wood in dune slacks. In Ireland where this species is far more common, it occurs on river banks, in old gardens and even on old drystone walls (sometimes quite a distance from any standing water) as in the area around Lough Erne in Northern Ireland.

The record from Asselby Island occurs within the known range of habitats for this species. It is conceivable, therefore, that it may occur at other sites along the length of the River Ouse and, possibly, even on some of the other river systems. It could have been easily overlooked as a small immature specimen of one of the other *Succinea* species. Both *Succinea (Succinea) putris* (L. 1758) and *Oxyloma pfeifferi* (Rossmassler 1835) occur commonly throughout Yorkshire in habitats of this type.

ACKNOWLEDGEMENTS

I would like to thank Mr Brian Coles for the very detailed information on the site and I would also like to thank Dr. L. Lloyd-Evans for confirming the identification.

A. Norris

SOME BOTANICAL CORRESPONDENCE OF THE MID-19th CENTURY

G. A. SHAW

The following letters from Rev. Gerard E. Smith (1804–81) and Henry Boswell (1837–97) to John Barton were given to C. A. Cheetham (1875–1954) by Claude Barton, agent to the Clapham estate of the Farrars. It was suggested by Burrell that Claude Barton was perhaps a son of John Barton. The letters have interesting observations on various ferns and on *Viola lactea* and related species, while that from Boswell refers to several mosses. Smith's plants are now housed at Oxford, and his correspondence is mainly at Kew; Boswell's Herbarium is also at Oxford and his letters are at the British Museum (Natural History).

Copse Hill, Ashbourne
19 September 1955

My dear John

Accept a brief reply to your welcome letter. I am glad you love Ferns. Nature admits them at court among her nobility of the Forest and her gentry of the hedgebank: indeed they are rarely seen in plebian company with weeds on *ploughed* land. We ought not to deny them a place in our flower borders: they add far more ornament than they receive however. Aspidium lobatum, Adiantum pedatum & Aspidium mass do well in any border & in damp borders many others succeed.

Both the plants you have sent are A. angulare. If I can find it I will enclose a frond of A. aculeatum. A. lobatum is a variety of A. aculeatum. In the Isle of Wight I found them growing on the same stalk, but generally they are varieties marked from the earliest age.

A. lobatum occurs *very fine* in the lane of Horton near Stowling, towards Standford. The angle made by the pinnules in A. aculeatum is more acute than in A. angulare.

Cistopteris fragilis varies exceedingly. I will endeavour to send you extreme cases of this difference. The species might well be called C. impar. Still, there is a general resemblance in all the forms, & the involucre is the same in all. In a cave you have the more attenuated pinnule, and on a rock on a high mountain, the frond is often almost as simple as Woodsia hyperborea. Dentata is no species, I believe: Dickeana and alpina are the only other British plants worthy of the distinction.

As to localities in your neighbourhood *A. Thelypteris* I have from Mr. Bayton's locality, *"a marsh at Walberton"*. *A. oreopteris* I have never seen nearer than a roadside common, beyond Midhurst, on the old London road.

Asplenium lanceolatum did grow on the High Rocks, near Tunbridge Wells. *A. marinum did* grow on the rocks at Castle Hill, Hastings, & I gathered a specimen once where the Hotel at St. Leonards now stands. I have never heard of either in the Isle of Wight.

Osmunda regalis, plentifully about Gorner Pond, between Gosport & . . . (?), with Myrica Gale &c.

Botrychium lunaria. I have never seen in your neighbourhood nearer than the high parts of the North downs above Elstead &c., & at the feet of Pteris aquilina in Hastings Combe.

Ophioglossum vulgare is abundant in meadows at East Marden. Snails are very fond of both these, so affirms Mr. Robert Sims, Nurseryman, . . . (?), Kent, who sells all the rarer species.

Ceterach vulgare, grows on the ruins of outhouses about Batten's place at East Marden.

We have Cryptogramma crispa, Asplenium septentrionale, Asplenium lanceolatum, & Trichomanes, Aspidium lobatum & angulare & A. filix-foemina growing on our rock work, & Osmunda regalis with Onoclea sensibilis by the door.

I am exceedingly glad to hear you speak so highly of . . . (?) Gill. May the relation between you prove a blessedness and a bond of love to you both . . . (?). Such bonds are stays and shields for which young men especially have need to praise God.

Thank you for writing to me, and Believe me, My dear John,
ever most truly yours,
Gerard Smith

Gerard Smith to John Barton

Copse Hill 9 May '56

My dear John,

Your letter was cordially welcome, and would have been more promptly answered, had I been able to give a clear account of my views upon bog-violets, which, I confess, removal from the south to the north and from east to west has tended to mystify considerably. When at dear East Marden, I believed in V. canina, flavicornis & lactea: but the plants of Yorkshire, Merioneth, Derbyshire and Worcestershire have united in supplying materials for good bridges over the gulphs and appeared to separate those species one from another. Here we seem to have one violet only: a plant with the old and dead shoots below those of this spring — with a small flower of variable hue, & with stipules ciliated or entire. We have not, so far as I have seen, the plant with large flat faced flowers so frequent in the south of England upon calcareous soil. I enclose an Osmaston violet, V. canina, & with it two plants, which are very normal states of *V. pumila* (including V. flavicornis & lactea), & of *V. canina*: but the remarks made upon the branches of the past being above the branches of the present year I have no means of verifying: my herbarium which is not poor in this genus affords us proof of this being the case with V. pumila at least. As to V. flavicornis, distinct as the compact plants of that upon waste places of the North Downs appeared to be — the limb so azure, the spur so yellow, the leaves so narrow & the stipules jagged and large, in Cheshire, near Chester, I observed the hedge violet — V. canina with yellow spurs and brilliant blue limbs while the foliage was broadly cordate & the habit that of the common V. canina. Again as to the azure colour of V. lactea — I have specimens from Brabourne Leas (?) & from North Malvern with white flowers & herbage of variable breadth and length: but I confess that I am not sure that V. lactea is not a species, & that the plants I speak of are white varieties of V. canina. The Tunbridge Wells & Cockbush (?) common V. lactea are exactly alike, & occupy similar stations among heather upon peaty soil. I left in the garden at East Marden a variety of V. canina from the downs above Elstead truly pink, & tufted — I have seen it dilute blue also, & thus so far as the colour is concerned, no rule can be made: but the straggling habit & attenuated points of the leaves of V. lactea seem to be more trustworthy characters. The best test would be the cultivation of the seeds of the supposed species: & I would recommend you also to set dear Elisabeth and Annie to work, to send you living plants of the violets now in blossom, from banks & woods, & the high Downs around Chichester, to compare with your local forms. Comparisons in this case are happy & useful. You would presently see whether you could group together forms under different types, or whether they undulate the one into the other like waves upon water & prove they are successive modifications of one form. I have omitted to mention that in V. lactea the direction of the leaves is, so far as I have seen, *upwards* & not spreading. Sowerby's figure shows that character, if I remember right. It is very pleasant to think of you taking up the garland which fell from your beloved Father's hand, & I do hope you will never forsake his (botanical) friend, but that we may enjoy much refreshing & improving intercourse amidst nature's lovely scenes, or at least in the study of flowers. I thank you for the account of Professor Henslow's lecture: I have read of his Parochial class in Botany, & shall send him, if I am permitted, an order soon for dried plants. He & I once exchanged frequently. Both Edinburgh & London Botanical Societies have made that a business which used to be a private pleasure — I mean the exchange of plants & people are apt to become selfish where exchange is made. I do not apply this remark to the Professor. He was always very liberal.

Can you send me a few *fresh specimens* of Anemone pulsatilla? I have received this and roots of Anemone ranunculoides from Waltham Abbey woods. But I must finish. Our mutual pastimes have, I trust, a true bearing upon the great end of life "Great are the works of the Lord, sought out of all of them that have pleasure in *Him*." To His care and love I commend you! Mrs Smith unites with me in affectionate remembrances. We both blame Joseph for passing so near us & not coming to us: *but he is in love!* Believe me, ever,

dear John, your affectionate friend

Henry Boswell to John Barton

Oxford 17 April 1860

My dear Sir,

Having an hour's leisure to-day I have looked out some Mosses for you at once, which I hope will please. They are none of them common, & mostly rare. I doubt not I can find you a good many more yet, wh. I will send as opportunity offers. The common species you can find yourself I suppose. Any that you gather I shall be happy to name for you, if I can: the best way will be for you to number or name them and send me a portion numbered or named to correspond.

There are two mosses said to grow in Devon which I much want to obtain *in quantity*. Tortula cuneifolia, resembling T. muralis and T. marginata, (wh. latter I send) but with broader leaves. This is *full ripe now* on "banks nr. the sea" and on old walls: said to be abundant in Devon.

Glyphomitrium Daviesii is found on Dartmoor & other places near, and I believe the present is the best month for it. It is allied to the enclosed Ptychomitrium, but a smaller plant, with a small round capsule, growing "in dense dark green tufts, usually in crevices of detached rocks" says Wilson: It is a species I have never seen, but long desired for myself & several correspondents. If you can obtain a stock of these I can probably get you some good things in return.

Thanks for the Trifolium — very welcome, as will be most of your Devon plants, and especially Trichonema, which I hope you will find.

It has rained so of late that I fear the Fritillaria will be flooded out, and I have none with bulbs attached, but I hope to get it yet: will go first fine evening.

Your letter tho' dated the 12th arrived only to-day.

Excuse the paper — no more at hand and I am almost too late for post.

Yours very truly,

H. Boswell

A note has been added to the correspondence by Burrell, to the effect that the following mosses gathered by Boswell are housed in the Ingham herbarium at the University at Leeds: *Dicranella cerviculata, Campylopus atrovirens, Ptychomitrium polyphyllum, Pottia lanceolata, Tortula pusilla, T. rigida, T. laevipila, T. marginata, T. aloides, T. convoluta, T. Hornschuchiana, Barbula rubella, Weissia viridula, Ulota Bruchii, U. crispa, Orthotrichum affine, O. pulchellum, O. tenellum, Catoscopium nigritum, Bryum atropurpureum, B. pseudotriquetrum.*

I wish to thank Dr W. A. Sledge for assistance in deciphering some of the more illegible parts of these letters.

BOOK REVIEWS

Wildfowl of Europe by **Myrfyn Owen.** Pp. 256. Macmillan, 1977. £15.00.

The first sixty-eight pages (Part 1) deal extensively with the evolution of wildfowl; the subtle adaptations for their particular foods and environments; population studies; specific display (a section particularly enhanced by Joe Blossom's line drawings); interactions between man and wildfowl including some which had not previously occurred to me; and migration and ringing. A healthy reminder in the final two sentences of Part 1 ". . . one important rule — never be detected by the birds. That way the watcher sees more for a longer time and the birds themselves are no worse off for his visit."

The major part of this extremely valuable addition to the ornithological literature consists of accounts of all the European species. There are summer, winter and migration distribution maps based on international wildfowl counts. Results of the vast researches into wildfowl are brought together conveniently in one place. Here we may learn that 73% of Eider eggs on Spitzbergen are eaten by gulls or foxes; that in southern Britain, loss of $\frac{1}{3}$ of all Mute Swan eggs is attributable to human agency, mainly small boys taking or destroying them. Explanations are given for the German and Russian names for the Bean Goose (Saatgans and Gumennik respectively). On lead poisoning (not from only shooting, but also from ingested food picked up with grit) we learn that a single pellet may produce sufficient toxicity to kill a duck; or three pellets to kill a Bewick's Swan. These random examples will serve to show what a wealth of detailed information is available. The delightful full-page colour illustrations, fifty-five in all, will be of particular interest to Y.N.U. members since they are the work of Hilary Burn.

This is a volume which should be on every bird-watcher's shelf. The price may seem high but it will inevitably prove a collector's piece and in that event a good investment.

R.F.D.

Rare Pheasants of the World by **D. Grenville Roles.** Pp. 106, with drawings and colour plates. Spur Publications Co., Hampshire. 1976. £7.30.

As the publishers say, this is a book which can be recommended to all who are interested in pheasants. The author is widely experienced in keeping pheasants and other birds in captivity; his book contains a deal of interesting reading for pheasant-rearers and aviculturalists generally.

B.S.

They Love and Kill by **Vitus B. Dröscher.** Pp. 363, with black and white and colour photographs, drawings. W. H. Allen. 1977. £6.50.

Subtitled "Sex, sympathy and aggression in courtship and mating", this book is a readable, well-translated but thoroughly anthropomorphic account of courtship in animals. I recommend it unconditionally to readers of "True Romances", but those with a genuine interest in the ways of animals might soon find its interpretations tiresome.

B.S.

Primate Ecology: Studies of Feeding and Ranging Behaviour in Lemurs, Monkeys and Apes edited by **T. H. Clutton-Brock.** Pp. 631, with tables, figures, black and white plates. Academic Press, London. 1977. £25.00.

A collection of 17 papers, all based on field studies of ". . . behavioural aspects of ecology: activity patterning, food selection and ranging behaviour . . ." of primates. The species studied include lemurs, indris and sifakas of Madagascar, titi, howler and spider monkeys of South America, gorillas, chimpanzees, mangabeys, gelada baboons, and colobus and leaf monkeys of Africa, siamangs and orang utans of Malaya, and rhesus monkeys of India. The contributors are twenty highly competent field scientists, and the editor has presented their papers admirably, contributing two final chapters (one with P. H. Harvey) which ". . . survey

some of the generalizations emerging from comparison of inter- and intraspecific differences in feeding and ranging behaviour". These are followed by three appendices on field methods and measurement techniques. This is a monumental book, mainly for the specialist in primatology, and for ecologists with particular interests in primate feeding and social behaviour. As a source-book of field information it may be equalled, but will never be outdated.

B.S.

Wildlife in Custody by **Ken Williams** and **Ian Skidmore.** Pp. 195, with 8 pages black and white photographs. Cassell and Co., 1977. £4.50.

By the end of page four I had come across "manic cries of the sandpipers, enchanting birds like sparrows on stilts with bright red legs"; "dunlings"; and "knots running in and out with the tide . . . like a well-drilled corps de ballet looking for seaworms". I had been expecting a natural history book, and this was sufficient almost to persuade me to read no further. But I'm glad I did.

Full of anecdotes from Williams's life as a village constable in North Wales, it is basically an autobiography. (Despite the dual authorship it is written in the first person.) The key is contained in one sentence. "I loved being a policeman but there was a part of me which wanted to work with animals." It makes very entertaining reading — one can almost hear the Welsh accent. Not really one for the natural history bookshelf though.

R.F.D.

Insect Life by **Michael Tweedie**. Pp. 192, with numerous black and white photographs and line drawings. Collins Countryside Series, 1977. £2.50.

This is a thoroughly good book, serving both as a very adequate introduction to insect biology and as a diversion for the jaded entomologist. At £2.50, it could hardly be cheaper. The ground, of course, has been covered before, by authors of such distinction and scholarship as A. D. Imms, but Michael Tweedie's clear style and fresh insight makes his book a worthy successor. There are, however, a few weaknesses to be noted. More a traditional account brought up to date than a radically new approach, the incorporation of relatively new knowledge is patchy. For example, recent interest in the relationship between insect and flowers, with its emphasis on co-evolution, is put over very well, whereas the questions of "Why are insects small?" and "Why do moths fly to lights?" receive limited and outdated answers.

The numerous photographs, all by the author, are as sharp as could be, and one of the best features of the work. In most cases, but not all, it is clear why they have been included. The line drawings, by Denys Ovenden, are nearly all models of their kind.

The first two chapters deal with structure, function, life histories and the like, along with diversity and migration. A criticism here is that topics tend to be treated in isolation, with little attempt at logical progression from one to the other. This is also true of chapter 3 which deals with 'special relationships' (insects and flowers, parasitism, social behaviour). Chapter 4 deals with taxonomy and classification and chapter 5, relations with man. There is a full index, a glossary and a section on books to read. An underlying theme of the book is the need for greater knowledge of insects so that they may be effectively conserved. The telling point is made that many insects will become extinct before they are discovered and described. In the final paragraph of the book the blame for this and other ecological bad news is laid fairly and squarely at the door of habitat destruction. A commendable end to a commendable book.

S.L.S.

The British Butterflies. Their Origin and Establishment by **R. L. H. Dennis.** Pp. 318. E. W. Classey, Faringdon, Oxon. 1977. £10.00.

This book is a review of evidence relating to the origin of the British butterfly fauna. It starts with a description of the major events of the Pleistocene and goes on to an account of recent butterfly distribution and ecology. An arrival sequence is suggested, followed by a discussion of selected species. It is suggested that few species can have been here for more

than 9000 years. The author clearly thinks that far too much emphasis has been placed on Pleistocene changes when discussing the establishment of the British fauna and too little on repeated migration and rapid evolutionary adjustment under natural selection when conditions permit. In many respects this seems reasonable, but the book does not make a clear case. It would benefit greatly from a more concise presentation and simplified style. Those with a knowledge of the British butterflies will find it interesting to compare with the views expressed by E. B. Ford in such a lucid style.

L.M.C.

Ants by **M. V. Brian.** Pp. 232. New Naturalist, Collins. 1977. £5.95.

Any new issue in the excellent New Naturalist series is eagerly awaited, and this latest one will appeal to a wide range of natural historians. It covers in considerable detail the anatomy, feeding, breeding, population dynamics and social biology of all 47 species of ant native to these islands. There is a key to these species based where possible on those characters of the workers which can be determined with the use of hand lens. The dichotomies are clear and simple, and illustrations are used to help with some of the more difficult distinctions.

Two colour plates by Gorden Riley have been specially painted for this volume. They show 17 insects in colour at magnifications of x10 or x8 and will be a very useful aid to identification.

While Dr Brian gives a full account of the more unusual aspects of ant biology including their nest-building, farming of aphids, relations with other ants and with the uninvited sharers of their nests, one cannot help but feel that, compared to their cousins of lower latitudes, the British ants are just a little mundane. There is a feeling that if the author could only mention this example from South America, or that species from Java the text would be so much more interesting.

An account of many of the methods used in studying ants in the field and laboratory is given. For instance, the nests of several species have been investigated by the cunning ploy of injecting rubber latex into the tunnels, then excavating the rubber tangle which results. Plate 6 shows four such casts slung in a metal frame in what makes a singularly uninformative illustration.

In a very valuable Appendix by K. E. J. Barrett the distribution maps of all 47 species are presented. Unfortunately, at four maps to the page the printing quality is less than perfect and the British and Irish 100 kilometre grid lines catch the eye before the distribution dots. It is a pity that the convention used in the Atlas of the Breeding Birds of omitting the grid lines from the sea could not have been employed. This section shows most clearly the need for field work on ants outside the southern counties of England.

On balance this is a most informative account which fails only to convey the more bizarre aspects of ant natural history. This may be a failing of British ants, or of your reviewer in expecting too much, or of the very matter-of-fact literary style of Dr Brian. It will certainly be the book to which everyone goes first to find information on British ants, and it is likely to maintain this position for a good many years to come.

M.J.C.

Arachnida by **Theodor Savory.** Pp. x + 340, with 107 figures. 2nd ed. Academic Press, London. 1977. £10.80.

Arachnida, like scorpions and spiders, are feared by many people, as Mr. Savory relates in the chapter on Arachnophobia in this book. But they also fascinate, and no current book introduces these invertebrates with greater enthusiasm. Zoologists, graduate and undergraduate students, as well as interested amateurs, will all profit from it. To paraphrase George Bernard Shaw, the book strives to cover Arachnology while keeping us fascinated.

And yet, it must be pointed out that the large and growing field of Acarology has been distinctly played down. A respectable amount of work on acarine physiology and genetics has been published within the last dozen years or so, but it is only faintly reflected in this book. Nor is the history of this discipline covered at all. The virtual exclusion of the Acari from the second and fourth parts of the book (with the exception of Chapter 30) regretably detracts

from the book's comprehensiveness. This reviewer also failed to understand why specific names were italicized, whereas generic names were not.

'Arachnida' is an authoritative, easy-to-read and interesting book. With its scholarly, distinctive style it should meet with as much success as the first edition.

U.G.

A Nature Conservation Review edited by **D. A. Ratcliffe.** 2 volumes: pp. xvi + 401 + coloured frontispiece + 24 monochrome plates + 9 maps; pp. viii + 320. Cambridge University Press. 1977. Vol. 1, £35.00; Vol. 2, £25.00.

This publication provides the most comprehensive review of nature conservation of any country in the world. It has taken twelve years to prepare, and represents a major landmark in world conservation.

Volume one outlines the objectives, discusses the methods employed in the selection and grading of sites, and ecologically appraises, with the aid of tables, plates, etc., each of the seven major ecological units (coastlands; woodlands; lowland grasslands, heaths and scrub; open waters; peatlands; upland grasslands and heaths; artificial ecosystems) in which the sites are categorized. Further chapters are devoted to conservation of the different groups of flora and fauna, and to a discussion on the attainment of objectives.

Volume two contains detailed descriptions of each of the key sites itemized in volume one. A few raised eyebrows may result from naturalists seeing some of their closely guarded secrets in print, and some will question the inclusion or omission of particular sites, but in Dr Ratcliffe's words, the publication "is a means to an end and not an end in itself".

The comprehensive treatment of the subject is a tribute not only to Dr Ratcliffe but also to the considerable amateur and professional participation in the scientific approach to nature conservation in Britain. The books provide an essential reference source for ecologists, biogeographers, environmentalists, and all those engaged in nature conservation; librarians particularly should take note of the potential demand, for unfortunately at this price the volumes will not find many individual owners.

M.R.D.S.

Scientific Aspects of Nature Conservation in Britain. Pp. xii + 103. The Royal Society, London/University Press, Cambridge. 1977. £3.50 U.K. addresses, £3.65 overseas.

This bound volume contains a collection of papers which formed a Royal Society Discussion held on 10 June 1976. Six major papers, on objectives, methods, achievements, measurement of change, etc., are supplemented by a preface, concluding remarks and discussion. This work will be of particular importance to those engaged in practical conservation on a scientific basis.

The Making of Geology: Earth Science in Britain 1660–1815 by **Roy Porter.** Pp. xii + 288. Cambridge University Press. 1977. £8.95.

In the words of the author, this book provides a study of "the transition from earlier beliefs about the Earth and ways of investigating it, to the science of geology as practised in the nineteenth century"; it does not "biographize individual geologists or expound their discoveries and theories". This work is essentially about geological thinking rather than geological practices, with some information on social background, but very little anecdotal material. Nevertheless, science historians and bibliographers will not be disappointed, for there is a wealth of biographical material to be gleaned from the text and notes, and a comprehensive list of more than 800 references to follow-up. Richard Richardson (1663–1741), the Yorkshireman, receives several mentions; however, the work *Extracts from the literary and scientific correspondence* &c., published 94 years after his death, is incorrectly cited.

This is undoubtedly a scholarly work, but some will find the style, which is overloaded with jargon, hard to assimilate.

M.R.D.S.

SHORT NOTICES

101 Wild Plants for the Kitchen by **Geoffrey Eley.** Pp. 71. E.P. Publishing, Wakefield. 1977. £1.45.

Interesting text spoilt by some mediocre line drawings, a few of which are positively misleading — an unfortunate feature in a book purporting to give guidance on the use of wild plants for human consumption.

Nerves and Muscle by **Michael A. Tribe** and **Michael R. Eraut.** Pp. viii + 189. Cambridge University Press. 1977. £8.50 hardback, £2.95 paperback.

A clearly expressed unit on 'communication between cells' for a basic biology course for upper schools and colleges, ably supported by photographs and line drawings, programmed data, self-assessment questions, and a glossary.

The Lapwing, Journal of the Doncaster and District Ornithological Society. No. 8 (Feb. 1975, 20p; No. 9 (March 1976), 30p; No. 10 (May 1977), 35p. (Prices include postage.) Obtainable from: M. Limbert, 23 Brockenhurst Road, Hatfield, Doncaster DN7 6SH.

The Marine Environment edited by **John Lenihan** and **William W. Fletcher.** Pp. xiv + 170, with numerous tables, line drawings and b/w plates.

The fifth volume in the useful 'Environment and Man' series, containing five important papers on marine production, biological consequences of oil spills, inorganic wastes, power from the tides and waves, and desalination.

A Key to the Adults and Nymphs of British Stoneflies (Plecoptera) by **H. B. N. Hynes.** Pp. 92. Scientific Publication No. 17, Freshwater Biological Association. 3rd ed. 1977. £1.00.

A reprint of the second (1967) edition, with the addition of several references, and notes onthe present status of *Chloroperla* and recent findings on the nymphs of *Isoperla*. The distribution maps have not been up-dated.

Yorkshire Mammal Meeting

There will be a Mammal Society Regional Meeting on Saturday, 25th February, 1978 in the Zoology Department of the University of Leeds. It is hoped that the meeting will provide an introduction to the study of mammals with particular reference to Yorkshire. There will be a series of short talks throughout the day by naturalists active in the area, a series of demonstrations and an opportunity to join the Mammal Society and the York Mammal Group. The Mammal Society is launching a youth section and this form of membership will also be available at the meeting. Anyone wishing to attend should contact R. G. Loxton, Department of Pure and Applied Zoology, University of Leeds, Leeds, LS2 9JT.

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THE YORKSHIRE NATURALISTS' UNION

THE NATURALISTS' YORKSHIRE

Compiled by members of the Yorkshire Naturalists' Union and edited by W. A. Sledge. Pp. 96 with 15 photographic illustrations. Dalesman Publishing Co. Ltd. Obtainable from Dr. W. A. Sledge, Department of Plant Sciences, University of Leeds, Leeds 2. Price 60p plus 16p postage.

THE LEPIDOPTERA OF YORKSHIRE

Separates of the collected instalments which appeared serially in *The Naturalist* (1967-1970) are available from Dr. W. A. Sledge, Department of Plant Sciences, University of Leeds, Leeds 2. Price 50p plus 9p postage.

Also "The Macro-lepidoptera of Spurn Head, E. Yorkshire" by S. L. Sutton and B. R. Spence (ex *The Naturalist*, 1974); price 25p plus 9p postage.

Y.N.U. NEWSLETTER

The Y N.U. Newsletter, sent to all Full members and Affiliated Societies, is published twice a year: May and September. Its aim is to provide a means of intercommunication between all members by giving, foı example, reports on Y.N.U. and Society meetings and activities, items of broad Natural History interest, details of types of surveys and enquiries. All items should be sent to the Newsletter Editor: Mr. H. T. James, 238 Sigston Road, Beverley, Yorks.

LECTURING SERVICE

The Yorkshire Naturalists' Union maintains a list of speakers willing to lecture on a variety of natural history subjects. Secretaries of Affiliated Societies and similar bodies should apply to the Administrative Office, Mr. D. Bramley, c/o Doncaster Museum, Chequer Road, Doncaster DN1 2AE for further details of this service.

Notice to Contributors to the Naturalist

Manuscripts (two copies if possible), typed double-spaced on one side of the paper only with margins at top and left-hand at least 2.5 cm wide, should be submitted. Latin names of genera and species, but nothing else, should be underlined. S.I. Units should be used wherever possible. Authors must ensure that their references are accurately cited, and that the titles of the journals are correctly abbreviated. Tables and text-figures should be prepared on separate sheets of paper. Drawings and graphs, drawn about twice the linear size they are to appear, should be in jet-black Indian ink, and legends should not be written on the figures.

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THE DISTRIBUTION OF LARGER FUNGI IN YORKSHIRE

ROY WATLING

Royal Botanic Garden, Edinburgh

1977 Presidential Address to the Yorkshire Naturalists' Union

It is with some trepidation that I stand before you today in a place taken earlier by such great mycologists as W. Fowler (1876–77 & 1901), C. Crossland (1907), H. Wager (1913), W. N. Cheesman (1916), T. Petch (1921) and F. A. Mason (1934) and, during my own early days in mycology, by the late A. A. Pearson (1946) and E. W. Mason (1953) whose friendship was greatly appreciated, and also by two currently active mycologists, Dr John Grainger (1956) and Prof. Noel Robertson (1966), with whom I have valuable contact.

My good friend Elizabeth Blackwell on two earlier occasions (1961a and 1961b) has dealt admirably with the fungus forays held in Yorkshire and the history of the Mycological Committee, and has also outlined present-day links with past Yorkshire mycologists. She has therefore covered the history, forays and personalities of Yorkshire mycology, so one might ask is there really anything more to talk about? Yes, one aspect of Yorkshire mycology has gone untouched and therefore today I wish to discuss the actual fungi THESE personalities found on THESE forays, and how it has gradually proved possible to build up a picture of the distribution of some species of fungi collected by the early mycologists.

We are all field naturalists and whether we appreciate it or not we accept without question the dynamic and heterogeneous characteristics of the plant and animal communities in which we collect or, to use mycological parlance, foray. These ecoloigical parameters interested me from an early age and later it became possible to marry taxonomic and ecological disciplines into a single study of the distribution of fungi. This address could have been entitled "From field to laboratory and back; part 2", Dr. John Grainger (1957) having given the first part as his Presidential address in 1956. Like him my occupation allows me to couple work on the living plant in its natural setting with laboratory activities, and return to the field to test any hypothesis formulated and suggest ways of utilising the resulting information on an economic basis.

For instance, to whet the appetite, over 70,000 hectares of Yorkshire are under plantation trees, which are potentially mycorrhizal; that is they have a nutritional relationship with a fungus or fungi on which they are dependent for active life. Would it not be useful to know the limitations on the growth of these fungi? There is every indication from laboratory experiments that some strains of mycorrhizal fungi are more efficient than others in promoting or assisting tree growth. Should we not therefore, whenever possible, select such fungi consciously, and introduce them into the plantation soil? Conversely, what if all these trees fall to the ravages of root rotting fungi? Should we not attempt a fuller understanding of the biology of both friendly and detrimental fungi?

Let me first of all outline the vastness of the problem in relation to Yorkshire, a maritime county with 183 km of coastline, nearly as large as Wales. Its area is slightly over 1½ million hectares distributed over five vice-counties with a central vale extending from the Tees, which forms its border with Co. Durham, southwards to the head of the Humber. A series of vales, successive ranges of hills and a great aggregate of elevated moorland characterise the northern area. In the south from the cliffs of Flamborough a flat agricultural zone rises into a broad range of wolds separating the eastern area from the central valley. As one proceeds west, the countryside becomes more diversified with valleys, rising ground, moorland and more massive hills up to 792 m in height. Such are the diverse habitats usually with axes of elevation nearly coinciding with the west boundary and inclined almost entirely eastwards.

The major geological features are of sedimentary origin with outcrops of igneous material. There is a general overlay of peat in the wetter, cooler west and boulder clay in the warmer, drier east. The base rich Magnesian limestone outcrops in the north-east and west of the

central valley and the older generally more acidic Millstone Grit series form an extensive region throughout the western area associated closely with the coal measure rocks, therefore dictating the industrial activity of the country's history.

Industry has also sprung up centred on the Jurassic rocks of the Middle Lias iron ore deposits in the Cleveland area. The whole of the central valley is on Trias rocks and the surrounding areas to the east on older Jurassic rocks; chalk (Cretaceous) forms the Wolds themselves. A varying pattern of soil type results from this range of rocks. The soil depends on rock type, altitude and the nature and extent of cultivation. The soils of the more elevated tracts are in general thin and podsolised and fit only for hill pasture when peat has not already dominated the system. In contrast the soils of the central valley are generally of greater fertility and support varied agricultural practices ranging from standing crops to cattle and sheep. In addition, both climatically and floristically, Yorkshire sits at the junction of northern and southern elements, a further attraction to the study of any facet of natural history in the county (Watling, 1972).

Fungi require suitable substrates and favourable places to live, and Yorkshire with its diverse geological, edaphic and biotic patterns offers a wide range; even a dung sample, a source of hours of mycological pleasure, good teaching material and a whole host of records, varies not only with the animal but with the diet of the animal, which depends in its turn on the plants eaten and the soil and rocks on which the plants grow.

The situation is further enriched in that J. H. Bolton (c. 1758–1799) lived and worked in Yorkshire, and we therefore have mycological records going back nearly two centuries. Since this period, of course, land utilization has changed considerably, so that we can possibly obtain some indication of the differences between the mycoflora of Bolton's time and the present day. It must, however, be appreciated that it was not until one hundred years after Bolton's death that drastic changes took place in land utilization. This can be measured to some extent by an examination of the available census catalogues of occupations in the county: at this period for the first time coal miners in the population outnumbered agricultural labourers (50,500) and these were only slightly greater in number than those employed in the then young steel industry.

The 607,005 hectares of permanent pasture, 404,670 h of arable land and 1¾ million head of sheep recorded in 1895 were soon to decrease dramatically with industrialization and the sprawl of urban communities. Numerous wooded valleys were destroyed although some were replaced by woodland policies and now stand at nearly 72,500 hectares, one third of which, frequently consisting of broad-leaved trees, are in private hands, the rest being mainly conifer woodland maintained by the Forestry Commission.

Man's influence can be observed throughout Yorkshire in the presence of many logan and standing stones and tumuli. However, one tends to believe the greatest changes have taken place since the Industrial Revolution; one forgets the burning and clearing of forests by early human communities. The net result has been irreversible damage; not only have some vegetational types been eliminated, others have been considerably altered, and the fungal components have modified in response to these changes.

Map 1 shows the range and extent of collecting areas visited by the mycological committee of the Y.N.U. since its beginning in 1881. Of course the Yorkshire records are not based on these forays alone; there has been intensive collecting by individuals or small bands of workers in certain areas which have added greatly to our knowledge: U. A. Thwaites at Swinton and Masham (Crossland, 1902, 1903), and later C. Crossland and G. Massee at Mulgrave Woods (Crossland, 1914), and C. Crossland and his disciples (H. T. Soppitt, J. Needham, etc.) at Halifax (Crossland, 1909). Even so the map indicates where it would be beneficial to hold future forays. There are some gaps in our knowledge, with areas such as those around Beverley and Aysgarth, which certainly warrant our attention.

Fruiting of larger fungi is erratic, even in the common species, and often only brief, the individual fruiting body being so ephemeral that much depends on the presence of an

---

Map 1. (Opposite) Fungus forays in Yorkshire Naturalists' Union and British Lichen and Mycological Societies which have been held in the country.


Castle Eden
61
62
63
64
65
Legend
Spring
Autumn
Spring & Autumn
Localities visited
BLS meetings only
BMS " "

interested party at the right place and the right time of the year, month or day. There is also the perennial problem of correct identification but this really applies or has applied to all plant groups. For instance, in 1950 when the *Atlas of the British Flora* was first discussed, safeguards were provided to meet the opposition to Prof. A. R. Clapham's 10 km × 10 km mapping scheme instead of simply abandoning the whole project. Fortunately, with such distinguished botanists as Roy Clapham, J. E. Lousley and M. Walters at the helm, common sense in botanical circles prevailed and now whenever in doubt we can refer to the *Atlas of the British Flora* (Walters and Perring, 1962). The British Lichen Society has experienced similar problems; if lichenologists and phanerogamic botanists can map their organisms, why not mycologists?

The fungi are considered one of the least known groups and there are few professionals actively engaged in their study. Thus, given the ephemeral nature of the fruiting body, the amateur's help is needed more than in many other disciplines of natural science. Once the differences between mapping vascular plants and fungi are appreciated, then it is up to the professional to overcome the biological restrictions which prevent the full use of amateur participation in mapping and recording schemes. When the work on the British Flora was at its climax, there was a dramatic increase in the volume of publications and student reports, especially from what was until then the comparative botanical desert of Ireland. Even vascular plants were as poorly known in Ireland in 1950 as are the fungi in many parts of Britain today. At the time of this activity, the amateur army was growing with a huge resulting increase in support. During the five years of accumulating material beginning in 1954, when the mapping scheme was officially launched, 'privates' were being recruited; then from 1969 to 1972 the studies tended to evolve from recording to more critical studies.

What are the mycologists doing? Since 1975 a cross-off card for the larger fungi produced by R. Rayner has been made available through the Biological Recording Centre and the British Mycological Society Foray Committee. Indeed the records for all the Yorkshire Naturalist Union forays have been transferred to such cards; each locality has been taken separately whenever possible. Members may not realise that the Mycological Committee has been running annual forays since 1881, from 1893, independently of the other vice-county field meetings, Yorkshire is unique in having such a vast array of records. It is indeed from these records that the major part of the data I wish to present in the latter part of my paper has been derived.

More recently A. J. S. Whalley and I have produced a small booklet on recording fungi with maps of the records made on British Mycological Society forays of a selected number of species of the Ascomycete family Xylariaceae. We are now carrying out a parallel study of the same species as recorded in intensively studied areas such as Yorkshire and Warwickshire, and a comparison is being made with herbarium material housed at Kew (Roy. Bot. Gdn and Commonwealth Inst.) and Edinburgh; the mycological collections formerly at the British Museum are now amalgamated with the Kew collections. But these studies would not have commenced or progressed so far without the underlying activity of the European Mapping Scheme. This is a study of one hundred species of larger fungi mapped on the 100 km grid system and deliberately chosen because they appeared to show some distributional pattern, southern, northern or continental, and were for the most part fairly easily identifiable. For those which were critical there was a contingency plan under which the recorders or their contacts checked the identifications. Results for the first fifty species have been published (Lange, 1974) and constitute a useful first stage. The beauty of well organised mapping and recording schemes is that over the years they allow amateurs to learn the ropes and professionals to re-assess their own concepts. Such schemes also have the advantages of indicating where errors lie and pinpointing the direction for future activity; once errors are eliminated a true picture is obtainable. Indeed mycologists have already been stimulated to check the records of selected species as they appeared in the European mapping scheme (Reid, 1975b). For a critique of fungus-mapping schemes the reader is referred to Reid (1975a).

I would now like to discuss, in the light of the European Scheme and British records, the distribution and occurrence of a selection of fungi found in Yorkshire; I hope that this will

highlight various biological phenomena and show how fascinating such a study can be, a subject which can be followed up further within the Union itself at its general meetings and forays. I have made free use of the maps published by my friends and colleagues, particularly those appearing in *Coolia*, *Dansk. Bot. Arkiv.*, *Norwegian J. of Botany*, *Ceská mykol.*, *Zeitschrift Pilzkunde* and *Svensk Bot. Tidskrift*. However, there is probably no comparable study to the one under way for Yorkshire; perhaps Wisman's recent studies in Friesland (1976) come closest.

Lene Lange (1974) has analysed the first group of fifty species selected for the European Scheme. The clearest characteristic of the distribution maps produced was the northern limits of the species. This was expressed in a seven-division system: 1. species which reach or exceed the northern timberline, 2. species with northern limit between 65°N and 68°N, 3. species whose primary distribution is south of Limes Norlandicus (with only a few records north), 4. species with northern limits at Limes Norlandicus, 5. species with northern limit coinciding with that of *Fagus sylvatica*, 6. species associated with the natural distribution of *Abies alba* (corresponding to a northern limit at almost 52°N), and 7. species with limit approximately coinciding with the northern limit of *Vitis vinifera.*

Neither group 2 nor 3 includes any representatives of the Agaricales (mushrooms and toadstools) whereas in contrast group 4, left until later for discussion, is a large group consisting of eleven species, eight belonging to the Agaricales. Category 2 contains *Pseudohydnum gelatinosum* and *Auriscalpium vulgare* and although both are recorded for four out of the five Yorkshire vice-counties both species are infrequently collected (Map 2); in the Netherlands the first has a central distribution although known from two localities in the north (Bas, 1967b).

Map 2. Distribution of *Auriscalpium vulgare*, *Lentinellus cochleatus*, *Pseudohydnum gelatinosum* and *Schizophyllum commune* in Yorkshire (all records).

Category 3 contains both the common 'stinkhorn', *Phallus impudicus* widespread from June until October in Yorkshire, Britain and Europe, and the decidedly uncommon cup fungus *Sarcosoma globosum*, not recorded as yet for Britain but with distribution centred in southern Finland and central Europe. Also included are the jelly fungus *Tremiscus helvelloides*, recently found at Dalby by W. G. Bramley confirming its presence in V.C. 62 (Mason & Grainger, 1937), *Gomphus clavatus*, 'Pig's ears', with records only in the south eastern corner of Britain, and the club-fungus *Clavariadelphus pistillaris* which, although widely distributed, is infrequent in the north. Of these both the first and last feature rarely in the flora of Yorkshire, the first having been recorded only twice in vice-county NE62, and the last once in NW65 and once in NE62. *P. impudicus* contrasts with the closely related *P. hadriani* in that the northern limit of the latter coincides with the northern limit of *Fagus*. In Britain the distribution of the latter does not reflect the ecological pattern evidenced in continental Europe; it is found around the Firths of Tay and Forth in Scotland, in Norfolk, on the east coast of Eire and in northern Somerset(?), many of these localities far north of the supposed distribution of *Fagus*. Surely it should be found in Yorkshire in communities similar to those at Spurn Point, a locality where it has been seen only once; a watchful eye should be kept. In Norway it is found only along the SW coast (Eckblad and Gulden, 1974).

From a Yorkshire, indeed British, point of view the species of category 1 make up a mixed group: the false morel *Verpa conica* is decidedly rare, yet more frequent in the south, and the puff-ball *Calvatia cretacea* is a typical arctic to sub-arctic species. In Norway for instance the latter is only found in Finnmark and the mountains of the central massif. *Russula claroflava* and *Lactarius turpis*, on the other hand, are very common in Yorkshire, probably because of the presence of innumerable birch woods, for these two species are considered as rather narrowly specialised in habitat requirements. *L. turpis* is certainly the commoner of the two, whereas *R. claroflava* is more restricted preferring rather damp, boggy birch woods. The two boletes of this same category, *Suillus flavidus* and *S. bovinus* show very different patterns within Yorkshire, the former being particularly rare, the latter quite common and frequently abundant. *S. flavidus* becomes commoner in Scotland; *S. bovinus* also increases in abundance northwards. Both are apparently mycorrhizal with *Pinus sylvestris* and are some of the most specialised examples of mycorrhizal relationship amongst the boletes discussed. *S. flavidus* like *R. claroflava* prefers damp woods, being usually a member of the wet hollow communities in remnant Caledonian forest, and only once have I collected it outside a natural pine-wood. *S. bovinus* on the other hand appears as much at home in plantations as in natural forests.

Although recorded for vice-counties SW and NE (Map 3) *Amanita porphyria* is a rare Yorkshire fungus; it too is a frequent member of the Scottish flora; it has also been recorded from several localities in the SE of England. The distribution of 'chicken of the woods' *Rozites caperata* in Britain has been analysed by Reid (1975b) and its rather odd distribution in the northern hemisphere has been discussed at an earlier date (Watling, 1974). Authentic material of *R. caperata* from Yorkshire has not been seen. The category contains three other species; *Armillaria mellea* the common and well-known 'Honey Fungus', and obviously the infrequent *Pycnoporus cinnabarinus* whose bright colours would certainly have been noted by trained mycologists even if not by collectors. It has been collected by Dr Ray Edwards at New Miller dam near Wakefield and this year (1977) at Bramham Park by Dr. Mark Seaward.

The third species, *Melanophyllum echinatum*, is more southern in its distribution in the British Isles. It is known from Yorkshire but its dull coloration probably results in under-recording.

Armillaria mellea is a problem, and its true distribution will not be clarified for many years. It is a complex of species of which those most certainly occurring in Yorkshire include *A. mellea*, with a yellow ring and floccules on the stem, *A. polymyces* with sepia scales on the cap, greyish or brownish ring and gills with a slight purplish brown coloration, and *A. ostoyae* with its rather more delicate, often umbonate cap and ring ornamented with erect-pointed, vandyke-to umber-brown scales.

Panaeolus semiovatus, a common dung fungus, is widespread in Britain and throughout Yorkshire and one would not consider its distribution in any way indicative of a particular

Map 3. Comparison of the distribution of four species of *Amanita* in Yorkshire.

trend. On a European scale, however, it has a decidedly north Atlantic distribution as well as producing some scattered records around the Baltic; throughout eastern Europe records are sparse. It is a fungus which can be expected to fruit at any time of the year and so appears on the species lists of both spring and autumn forays. It has a preference for base-rich dung, in common with many other species of *Panaeolus* and this contrasts markedly with the 'Dung round'; *Stropharia semiglobata* which, even when growing on the same cow pat as a *Panaeolus*, can be shown to be growing on acidic dung (Grainger, 1940; Watling, 1976).

Category 5 contains several species with a very evident relationship with *Fagus*, either obligately associated with the fallen debris, or else parasitic on or mycorrhizal with this tree. Of them *Marasmius alliaceus* is not recorded for Yorkshire and is rare in Britain. *Mycena crocata* is rare in Yorkshire, although it is more frequent in the south of England; this is unlike *M. pelianthina*, another species in the same category, which shows a more widespread yet overall restricted distribution. In Norway the distribution of this fungus is unusual as it is found only in the north in a small area around Tromsø (Eckblad and Gulden, 1974); in Yorkshire there are not more than ten authenticated records, all from the west and north.

In contrast *Oudemansiella mucida* is widespread and common; indeed this is a good example of how the distribution of a fungus in one country can mask its true range because of man's planting of a particular tree. Thus *Oudemansiella* fruits on *Fagus* on the shores of the Kyles of Tongue, Sutherland, well to the north of the natural distribution of *Fagus*. In Norway *O. mucida* and *Marasmius alliaceus* are found in the south east, around Oslo; and *Gomphus clavatus* shows a similar pattern of occurrence probably connected in this case with the calcareous soils found there (Eckblad and Gulden, 1974).

The spectacular *Strobilomyces floccopus*, 'Old man of the woods', and the related *Porphyrellus pseudoscaber* are two rather rare and interesting boletes; the first is characterised by its globose to subglobose, strongly ornamented spores and apparently has its closest allies not in Europe but in Australasia. Both species are not strictly confined to *Fagus* and their distribution probably reflects climatic limitations; even before the natural northern boundary of *Fagus* is reached, the records in Europe thin out. *S. floccopus* is apparently locally common in the Severn Valley and is seldom found elsewhere, but where it occurs it is very persistent. Thus only last year dried material of this fungus was sent to me by F. Murgatroyd, from North Dean Wood, Halifax; at this locality it was known to C. Crossland and members of the Halifax Scientific Society in the early years of this century (Watling, 1966).

Kriz (1966) states that in Czechoslovakia *Strobilomyces* prefers acidic, coniferous woodland but in Denmark (Lange, 1974) and Britain the reverse is true, preference being for broad-leaved woodland with rich soil. Both H. T. Soppitt (1891) and Roy Steele (1892) have discussed the occurrence of this species in Yorkshire.

If 'the Jew's Ear', *Hirneola auricula-judae*, is classified according to its northern limit it would probably be placed in category 5. It has a distribution close to that of *Phallus hadriani* in being confined to coastal areas in its northern most stations in Europe. In Yorkshire it is common and widespread on *Sambucus niger* although it may occasionally be seen on *Ulmus* and *Acer*. It has even been found on *Ribes* at Egton Bridge, on *Euonymus* at Hackfall, and on *Populus* and *Salix*, usually in proximity to *Sambucus*. In Scotland it has been found on wound-tissue on standing trees of *Acer negundo* and *A. laxifolia* var. *longilobum*. In the Netherlands it is found on the sea board and in the southern areas (Bas, 1966; van der Laan, 1976) and in Sweden it has been collected recently in the southernmost areas only, particularly near the coast (Alden, Nordin and Sunhede, 1976).

Categories 6 and 7 apply only marginally to Yorkshire, and indeed to the British Isles. Of the species studied in 6, *Sarcodontia setosa* creeps into southern England; it is obligately bound to *Malus* and in Germany it is irregularly distributed with far more records from the south (Krieglsteiner and Jahn, 1977). *Bondarzewia montana* and *Hygrophorus marzuolus* are unrecorded. It must be realised that although *Abies* spp. are planted throughout the country as ornamentals and sometimes even in small plantations, *Abies alba* did not reach the British Isles after the last glacial retreat; this may explain the absence of *Bondarzewia* and *H. marzuolus* in Britain.

In category 7 *Omphalotus olearius*, the 'Jack O' Lantern', frequently found on olive stumps in the Mediterranean has only recently been recorded from southern England, but the choice esculent, *Amanita caesarea*, has as yet never been seen in Britain. The only other species in this category is *Astraeus hygrometricus*, a false earth star. Although recorded from Yorkshire the records are somewhat in doubt. Palmer (1968), and I would agree, considers the early sightings by Bolton (1788) probably refer to *Geastrum vulgatum* and not *Astraeus*. Mason (1928) records *A. hygrometricus* for V.C.s 62, 64 and 65 although these are omitted later in Mason and Grainger (1937). Grimshaw's record (1891) from Wharfedale is undoubtedly *G. vulgatum*. *Astraeus hygrometricus* shows a central pattern of distribution in the Netherlands (Bas, 1967a) but may even prove to be extinct in the British Isles.

Now I will turn to category 4 which can be divided into two groups, (a) wood-inhabiting fungi and (b) mycorrhizals. Only the 'Giant puff-ball', *Langermannia gigantea*, and *Boletus parasiticus* fall outside these two divisions. The former is a very persistent fungus when it occurs. I have, for instance, found it at the site of a refuse-tip on the embankment of the River Calder at West Vale near Halifax over a thirty year period. It is widespread in Britain from south of the Cairngorms to the southern coast.

Boletus parasiticus has a tendency to be oceanic in distribution in Europe and although its host, the earth ball *Scleroderma citrinum*, continues past the Limes Norlandicus line, the bolete does not follow. *Scleroderma* is common and widespread in Yorkshire but the parasite is far from frequent. It is a highlight of a foray whenever *B. parasiticus* is found; the 1955 Pateley Bridge foray was the last time it was found in quantity in Yorkshire. It is recorded in Massee and Crossland (1905) from Scarborough, and in Crossland (1909) from Romfolly, Hebden Bridge from 1904 to 1906 based on James Needham's collections. The Needham

material has been examined and his collecting haunts revisited without finding the fungus again (Watling, 1958). It seems to be common in local areas in south-western England but becomes less frequent as one approaches a line joining the Tyne to the Mersey and is only infrequently found north of this, e.g. Loch Lomond in 1963. One wonders why there is such a discrepancy between the distribution of this bolete and its host.

Scleroderma citrinum and *S. verrucosum* are often so common they can become a nuisance in formal gardens, pushing up the gravel paths and making unsightly irregularities on garden verges, etc. *Pisolithus tinctorius*, found recently in both Norway (Eckblad and Gulden, 1974) and S.E. Britain (E. E. Green, *pers. comm.*), behaves similarly in Mediterranean climatic areas of Europe, S. Africa and Australia, and especially in North America where it often grows at the margins of swimming pools. In this fungus the spore-mass breaks up into a yellow powder which at first is often moist and if handled stains the fingers. It is a widespread fungus of arid regions particularly where the soil is low in organic content. Edaphic factors are apparently important and Lange (1974) records it from coal tips in Belgium and from Italian volcanic islands; Eckblad and Gulden (1974) record it in Norway associated with silver mines. It is undoubtedly mycorrhizal, in Australia with *Eucalyptus* where I am familiar with it, (unpublished data; see also Trappe, 1962) and in South America with *Nothofagus* (Moser, 1967). It is causing considerable interest in N. America where it is the subject of intensive mycorrhizal studies (Trappe, 1976). *P. tinctorius* probably has a high summer temperature requirement possibly with a continental pattern, although it is found at elevations of up to 1150 m in Yugoslavia. It is a common fungus also in arid areas of North America and the author was lucky enough to make the first record of it from Michigan — again on sandy mineral soil (Smith, 1966).

Pisolithus tinctorius is tolerant of soils poor in nitrogen and even phosphorus, whereas fruit-body numbers of *Paxillus involutus* often increase in nitrogen-rich soils. Dr. N. Sagara, University of Tokyo, asked me to examine the micro-habitat of the deep-rooting *Hebeloma radicosum* because he believed it was linked to nitrogenous substrates. This fungus, long called *Pholiota radicosa*, is recorded for vice-counties 61, 62 and 63, although it is certainly uncommon. I recently found this noble fungus growing near Silverdale, Lancs, and as Dr. Sagara predicted, the base of the stipe pushed through the soil but was not attached to the roots of a *Corylus* shrub next to which it was growing; they were intimately connected to the urine-soaked fur and soil of the tunnel of a small mammal. This fungus apparently requires particular nitrogen compounds for its growth and fructification.

(a) Lignicoles

The northern limits of the genus *Quercus* in Europe almost coincide with that of Limes Nordlandicus and this partly explains the northern limit of *Fistulina hepatica* 'the Beef Steak fungus', and *Xylobolus frustulosus* as both are almost confined to *Quercus*, although *Fistulina hepatica* does grow on *Castanea*. It does not explain, however, that whereas *Xylobolus* is rare in Britain, *Fistulina* is so common here, particularly in old oak parks (e.g. Cadzow, Chatsworth) and ancient deer forests (e.g. Sherwood), where it forms a very distinctive rot of the ageing trees. It would appear that whereas *Fistulina* is not limited by temperature patterns in Britain, *Xylobolus* demands the continental climatic regime of cold winters and hot summers as opposed to the more even temperatures and moister climate of the British Isles. In Norway the fungus *Fistulina* is rare and distributed to the east and south whereas *Xylobolus* is restricted almost completely to early records along the southernmost sea-board (Eckblad and Gulden, 1974).

Volvariella bombycina and *Hebeloma radicosum* are both placed in category 4 by Lange (1974). The former grows on dead trunks, stumps and sawdust, particularly of *Ulmus*, and its range in Britain reflects the more southern distribution of the whole genus *Volvariella*. In Yorkshire there is a single record from Scarborough. *Hebeloma radicosum*, however, although more widely recorded in Britain than *V. bombycina*, has a similar distribution to this species.

(b) Mycorrhizals

Three species of *Amanita*, *A. citrina*, *A. phalloides* and *A. strobiliformis* are included in category 4 along with a single bolete and a bolete-ally; see Map 3. *A. citrina* and *A. phalloides* have very similar distributions, although in Yorkshire the former is more common with var. *alba* apparently confined to beech woods. This distribution pattern continues into Scotland but here *A. phalloides* is decidedly uncommon and undoubtedly exhibits a more western distribution. Thus it is to be found in the Loch Lomond and Dumfries regions; it can be found, but less frequently, in S.E. Scotland e.g., Roslin Valley near Edinburgh. *A. citrina* and *A. phalloides* have frequently been confused so all old records cannot be accepted without some question; forayers always like to feel they have found the 'Death cap'! I have questioned several Yorkshire records including some from the Halifax Parish mainly because both Massee and Crossland (1905) and Crossland (1909), indicate *A. phalloides* as being 'Frequent on the ground, in woods'. Was this really so? After ten years of collecting in the Halifax Parish I personally have not collected this species and therefore in my appraisal of the Flora (Watling, 1966) the widespread presence of *A. phalloides* was questioned; but perhaps changes have taken place over the last 50 years bringing about an increase in rarity of the Death Cap. Although I have now seen not only colour transparencies, but material from Crag Vale near Mytholmroyd, it is still doubtful whether it is as common, or a spring fungus, as indicated by Massee and Crossland (1905).

A. strobiliformis is the third member of the trio. This species is relatively thermophilic in its primary distribution, in fact paralleling the pattern found in many species of the subgenus *Lepidella*. The fungus is recorded for Yorkshire (Mason and Grainger, 1937; N.E., S.W. and Mid. W.) but some records are doubtful because of confusion in Europe with *A. solitaria*, and even Massee and Crossland (1905) were sceptical of its presence in some parts of the county. Mason (1930) discusses the records and authenticates collections from N.E. and Mid W. vice-counties. From the wider angle it is recorded more from the south of England, although spasmodic records 'creep' up the coast into Eastern Scotland, i.e. the drier side of the country.

A. citrina in the Netherlands is widely distributed (Bas, 1967a) but *A. phalloides* is only found on the seaboard and in a strict central belt (Bas, 1967b); in fact many fungi have a central pattern of distribution in the Lowlands, e.g. *Squamanita odorata* (Bas, 1965) and *Schizophyllum commune* with the latter having an outlier in Limberg, where there is a rather different vegetational pattern (van der Laan, 1971).

Gyroporus castaneus is locally common in the Thames Valley; a single record exists from Yorkshire. There are only two species of this genus in Britain, *G. cyanescens* which turns blue on cutting and *G. castaneus* which has unchanging flesh. The two species are extremely interesting in that they produce lemon-yellow spore-prints and have an anatomy quite unlike any of our other European boletes. Of the two, *G. cyanescens* is the commoner; *G. castaneus* probably demands a rich clay or loam soil with *Quercus*.

The so-called lamellate bolete *Phylloporus rhodoxanthus* is another species of interest, apart from its evolutionary significance, in that its distribution is south of a line joining the Severn and the Thames with outliers in the Midlands and Yorkshire; there are a few records from elsewhere but the species is distinctly infrequent. However, where it does occur it is locally common, e.g. Halifax Parish in the valleys around Hebden Bridge. Several taxonomic questions will have to be solved before a full understanding of this species is reached, especially as the distinctions proposed by Singer (1945) to separate European and American subspecies are not consistent even within European collections. In the broadest taxonomic sense records range from the North Sea to the Black Sea; clusters of records come from Southern Sweden and adjacent Denmark (Lange, 1974).

Category 4 appears in general to be rather more arbitrary than some of the others recognised and should be analysed in more depth when more data become available; climatic factors are here probably more important than substrate preferences. The distribution does not coincide with that of any one host of mycorrhizal species or with the line indicating the southernmost limit of glaciation. It is interesting that several vascular plants are found further north than their accompanying (mycorrhizal) fungi, or that, if the plants occur, the regular mycorrhizal species are less able to compete with other symbionts more at home in

the more extreme conditions. Thus *Lactarius rufus* and *Russula obscura*, two species common in our coniferous forests, are to be found growing in Finnmark with *Russula claroflava* having formed an association with *Betula nana. L. rufus* is very common with naturalised conifers and plantation trees in Yorkshire but more rarely is it found with birch. There are undoubtedly a large number of mycorrhizal fungi in the flora of northern latitudes, and they play an important role in the economy of the ecosystem up to the timber line and beyond in the birch scrub in both subarctic/arctic and mountain environments.

Although mycorrhizal species with a narrow host spectrum reach far north, those which can switch hosts are at a decided advantage; *Amanita muscaria* with a very broad host spectrum penetrates far north and has been introduced into countries outside Europe along with plant material, e.g. Australia (unpubl. data). It is curious to see in Finnmark *Rozites caperata* and *Boletus piperatus* as prominent members of *Betula nana* heaths, when in Britain the former is found most frequently in the remnants of the Caledonian pine-wood and in Eastern Europe in oak woodland; *B. piperatus* is common in birch woodlands.

Four species in the mycorrhizal category have not so far been mentioned, the beautiful *Cortinarius violaceus* with but a few records from Yorkshire albeit widely scattered ones, *Ganoderma applanatum*, a common perennial bracket fungus found throughout Yorkshire, and *Fomitopsis rosea* and *Hymenochaete mougeotii*, both with few records. The last has been recorded from vice-county NW 65 and the *Fomitopsis* sp. from SW 63 based on a collection at Heath, Halifax, made by U. Bairstow, incidentally near one of the homes of the Yorkshire mycologist H. T. Soppitt. *H. Mougeotii* has a southern distribution in W. Germany along with other fungi such as *Podofomes trogii*, *Phellinus hartigii* and *Panus suavissimus* (Krieglsteiner and Jahn, 1977; Stangl and Krieglsteiner, 1977).

Cortinarius violaceus is characterised as being rare but scattered in its distribution; but a more definite pattern may emerge when the closely related *C. hercynicus* is clearly separated. A similar problem arises with *Ganoderma applanatum* (Map 5), British records of which undoubtedly include those of *G. adspersum (G. europaeum).* Unless specimens are available and fresh collections carefully examined there will be no way of solving the problem. Kotlaba & Pouzar (1971) have tried to work out the distribution of *G. adspersum* in Europe but based their study on limited information from herbarium material. *Cortinarius violaceus* like *Suillus flavidus* apparently fruits throughout its range over a very short period. This is in contrast to *Panaeolus semiovatus* which can be collected almost anytime and *Verpa conica* which is spring-fruiting.

Of the remaining species in the European scheme seven do not grow in Britain although *Montagnea arenaria* and *Endoptychum agaricoides* are of particular interest in that although they are considered Gastromycetes, the former is close to *Coprinus* and *Endoptychum* close to *Lepiota/Agaricus*, i.e. agaric genera! They both also have very broad distributions taken on a world basis; both apparently prefer fairly arid areas.

Several of the species to be considered in the next stage of the European scheme are found throughout Yorkshire and are familiar to many non-naturalists, e.g. 'Lawyer's wig', *Coprinus comatus*, which grows on refuse heaps, sides of roads, gardens etc.; I have even examined material from the Alaskan Highway (Watling and Miller, 1971). The same category of widespread fungi includes *Bulgaria inquinans* ('Black Bulgar'), common on *Quercus*, *Phlebia radiata* on twigs and branches, frequently of *Fagus*, *Piptoporus betulinus*, the birch polypore (in fact what would a Yorkshire birch wood look like without the common razor strap fungus), *Galerina mutabilis*, *Hygrocybe psittacina*, the 'Parrot mushroom' of hill pastures, and *Laccaria amethystea.* The last species is much more specific in its habitat requirements with its preference for dark shaded woodland than the exceedingly common *L. laccata.* Also to be considered here are *Clitopilus prunulus*, 'The Miller', *Agaricus xanthodermus*, 'Yellow staining mushroom', and the Bird's Nest fungus, *Cyathus olla* which, although seldom noticed may be found even in one's own garden if a careful search is made; it grows amongst last year's standing stems of herbaceous plants, or on compost heaps, sides of seed boxes or in well-manured arable fields, etc. *Agrocybe erebia* a drab-coloured fungus, is found in parks, gardens and hedgerows; it is widespread in Yorkshire perhaps preferring the base rich soils more frequently found in the east and south.

The last species to be included in this category is *Sarcoscypha coccinea*; it is widespread on

Map 4. Distribution of *Ganoderma applanatum* and *Fomes fomentarius* in Yorkshire (the former includes records of *G. europaeum*).

Map 5. Comparison of Yorkshire records of three species of *Xylaria (Xylosphaera)* with *Poronia punctata* (all records).

twigs and small branches of *Corylus* throughout the country in early spring, and is therefore infrequently seen on Society forays. It occurs from February to late April depending on prevailing weather conditions; it never fruits in autumn. Traditionally spring forays are held late April or early May, and autumn forays in September; this is undoubtedly to ensure that the mycologists attending see the largest number of species, but it also means that species with maximum fruiting occurring earlier in the year like *Sarcoscypha*, or in late summer like *Agrocybe praecox*, are less frequently recorded.

Several economically important fungi appear in the list under review, e.g. *Rhizina undulata* which, commencing from a burnt patch, can grow further to attack the roots of coniferous trees; *Heterobasidion annosum* which is also parasitic and disturbingly common in both deciduous and coniferous woodland, in the latter particularly being a destructive pest and producing a rapid debilitating root-rot. *Meripilus giganteus* although widespread, is certainly not common; it is often found at the base of beech-trees, the roots of which it attacks. Its distribution in Yorkshire and indeed Britain is dependent on the man-dictated distribution of *Fagus*.

A few species need special mention because of their obvious habitat preferences. *Poronia punctata* grows on horse dung and with the decline of the horse in active service in several walks of life suitable substrates are no longer available. Thus the records for Yorkshire from vice-counties 62, 63 and 64 have been mapped with respect to date (Map 4). Although once thought to be extinct in Britain the species still hangs on in southern England and last year I was excited to receive a communication from the Ringwood Natural History Society informing me of the presence of this fungus on pony dung in Hants. Map 4 contrasts the distribution of *P. punctata* with three species of *Xylosphaera* (= *Xylaria*) which have rather restricted distribution. *X. oxyacanthae* confined to growing on berries of *Crataegus*, *X. carpophila* on cupules of *Fagus*, and *X. longipes* most frequently on the branches of the introduced *Acer pseudoplantanus* but only in base rich areas.

The agances, *Galerina paludosa* and *Tephrocybe palustre*, can be considered as a pair as they often grow together. They are confined to *Sphagnum* bogs in, however, both woodland and open moorland plant communities. *Tephrocybe* evidently is parasitic on the bog moss as its radial growth can be mapped by the progressive death of the *Sphagnum*. Both species can be found from spring until autumn; the difference in number between the extremely few records prior to 1905 and the many recent records cannot be presumed to be of no significance. Although indicating the acidic moorland areas of the county the distribution-pattern also indicates where mycologists prepared to look at tiny brown and less spectacular agarics have collected. *Tephrocybe palustre*, recorded as *Collybia thelephora* in Mason and Grainger (1937), but only for V.C. 62, is so common it must have overlooked and *Galerina paludosa*, recorded by Mason and Grainger (1937) under *Tubaria*, has been found in all vice-counties although sparingly until very recently.

Russula claroflava, discussed earlier, may also grow in *Sphagnum* but it is not tied to the moss; it is restricted to growing with birch trees with which it is mycorrhizal and which are growing in the bog. *Mycena belliae* is also a bog fungus growing particularly on *Phragmites*. It appears to grow on remains of reed and grass stems which are standing in water and with the stem-base of the fungus just or about at water level. It is recorded from vice-county SW 63 on the basis of a very early record which I have been unable to confirm; Orton (1960) recently collected it in the Norfolk broads.

Psathyrella ammophila characterises sand-dune systems and, although not recorded for Yorkshire, it should be looked for in the sandy areas bordering the estuary of the Humber. As the epithet suggests it is closely tied to the grass, *Ammophila arenaria*, and the hyphae of the agaric can be located growing within the cortex of the grass-roots. *Marasmius epidryas*, described as growing on remains of *Dryas octopetala* from the Alps, is included in those species which are being mapped. I have visited several areas in Britain where *Dryas* occurs in the community, sometimes to the exclusion of other plants, e.g. Strathnaver, Sutherland, but I have failed to find this small agaric. It was exciting to find the species recently in some quantity in the Canadian Rockies in the Columbian Icefields indicating it is a widely distributed species. This is apparently the first record for the N. American continent.

Undoubtedly a careful search of the *Dryas* sites in the Littendale and Craven district will be worthwhile.

Of the Gasteromycetes under review I am unable to contribute much to what is already known *Clathrus ruber*, a member of a group of phalloids with their centre of distribution in the southern hemisphere is not recorded for Yorkshire. Its sporadic appearance in many parts of the British Isles from the south east of England to western Scotland may indicate a lusitanican distribution, or it simply might be expected to occur in areas modified by man when conditions are favourable. With *Dictyophora duplicata* things are rather different; all records of this species must be carefully analysed as there is little doubt that this widespread pan-tropical fungus has been confused with a veiled variant of the ordinary *Phallus impudicus*. Mason and Grainger (1973) record this variant (var. *togatus*) from NE 62 and it was found in very large numbers at Harewood Park near Leeds in 1970.

Myriostoma coliforme is a rare fungus, possibly now extinct in Britain. It differs from the ordinary earth-stars in that it dehisces not by one but many apertures; it is not recorded from Yorkshire. Although superficially similar to the earth-star it would appear not to be really close to them. *Gaestrum triplex* a true earth-star, however, is occasionally found in parks or gardens in Yorkshire growing in small groups. In Britain it undoubtedly occurs naturally in the south eastern part of the country. It prefers deep rich soil with a high content of organic matter.

Schizophyllum commune, although a cosmopolitan species ranging from the Far East to South America, and to North America, Europe, Asia and Africa, has a rather inexplicable distribution in Britain, unless restricted by a coupling of humidity with medium summer temperature. The species is quite widespread in south east England but very restricted in the Midlands; a few records, some on imported wood, originate from Yorkshire (Map 2). Finally in Scotland there are a few records, most of them not on naturally-occurring materials. *S. commune* is very variable in its substrate preferences, ranging in habitat from wood, e.g. *Fagus* logs in the New Forest, to actually growing as an active pathogen in humans (Watling and Sweeney, 1974).

Lentinellus cochleatus is widespread although not common (Map 2); a similar pattern is exhibited by *Tylopilus felleus*, a bolete with a vinaceous buff spore-point. The records seem to be dotted throughout the county without any correlation with climate or habitat. The same phenomenon apparently occurs with *Tricholoma sulphureum*, although there is some evidence that an edaphic factor enters in this case, the fungus seemingly requiring a fairly base-rich soil. In eastern Scandinavia it has a distinctly southern distribution almost correlated with the northern limit of *Quercus* which just reaches into S.W. Finland (Kallio, 1963). It is interesting to note that characteristic specimens have been found with *Corylus* in Sutherland on the northernmost coast of Scotland.

Taxonomic problems surround the identity of some members of the final group of fungi to be mapped, e.g. the distinction between *Inocybe patouillardii* and *I. jurana*, the confusion between *Russula virescens* and the cracking, green variant of *R. cyanoxantha*, the utter bewilderment in Britain during the last decade about the identity of red-capped species of *Russula* (including *R. lepida* although this should be fairly distinct), and the identity of the green-staining coral fungus *Ramaria ochraceo-virens* so common in the increasing plantations of *Picea sitchensis*. *Ramaria ochraceovirens*, although mentioned in Mason and Grainger (1937), is in fact widespread. Today there should be no problem in identifying the fungi mentioned above as they are now well described; one wonders indeed what the problems were in the first instance.

Reid (1975b) has examined the records of *Rozites caperata* in Britain and found that many are incorrect, being based on *Phaeolepiota aurea*, a very elegant agaric. The latter is uncommon but generally distributed throughout the British Isles. Although only sporadically fruiting, it often produces not only large but innumerable basidiocarps. It's cap is covered in a very fine pulverulence which comes off on the fingers when the fungus is handled. It is composed of globose to ellipsoid cells which form the veil in the early stages of growth. The veil is similar in structure to that on *Cystoderma carcharias*; in fact *Cystoderma* means just that, 'skin of cysts'! Although widespread, this fungus also is not common; it is very variable in habitat requirements, ranging from grasslands at sea level to those in the high mountains

of Scotland. It is rarely found in woodlands, unlike the much commoner and equally widespread *C. amianthinum*; this last fungus is very common in Yorkshire.

Choiromyces meandriformis is rare in Yorkshire and although there are widespread records for England it is rare in Britain too. It is a subterranean fungus and perhaps this is one reason why the distribution is so poorly known. In Germany according to Gross (1977), this fungus has a distinctly southern pattern of distribution.

A discussion on the tinder fungus, *Fomes fomentarius* has been left to the end as there are both ecological and historic factors affecting the final pattern of distribution. In Scotland *Fomes fomentarius* is common and along with *Piptoporus betulinus* and *Inonotus obliquus*, a fungus which has been used in preparations to cure cancer, it characterises our northern birch woods. South of Perth it is less common and, once into the borders, not only is it rare but apparently its host preference changes and it is found more frequently on *Fagus*. No records of *Fomes* on *Fagus* in Scotland have been traced, although this tree, as mentioned before, has been planted widely throughout the British Isles including Northern Scotland; Stevenson (1879; 1886), however, alludes to its possible presence on other hosts in Scotland. Although in Southern Europe *Fomes fomentarius* can be found on *Betula*, it has a wide host range and is much more common on *Fagus*, thus linking England with France and Germany, and Scotland with the Scandinavian countries. *F. fomentarius* is recorded for all Yorkshire vice-counties except the south west (Map 5); all records are on *Betula* except one on *Acer campestre* (Ashberry Nat. Res., Helmsley) and one on *Fagus* (Duncombe Park, Helmsley). It obviously occurs in a locality for very long periods, e.g. Duncombe Park for at least 40 years (W. G. Bramley, *pers. comm.*) and Meanwood, Leeds, for nearly 100 years, (Myc. committee unpublished data; Massee and Crossland, 1905). Colin Shields recently sent in a record of this same fungus on *Betula* from near Thorney, Nottinghamshire.

Dr. A. J. Whalley, Sunderland Polytechnic, tells me that he suspects a similar pattern to that of *Fomes* is found when one analyses the distribution of *Daldinia concentrica*. In England this fungus is common on *Fraxinus* whereas it is much more frequent in Scotland on *Betula*. There are several records from Yorkshire e.g., Sheffield, Hebden Valley, where *Daldinia* is found on *Betula*, although in keeping with more southern areas of the country it is most abundant on *Fraxinus*; it is infrequently recorded in the county on other hosts although it has been found on *Acer* at Nun Appleton, *Sorbus aucuparia* at Skipwell Common, etc. Often when it grows on hosts other than *Fraxinus* the substrate has been burnt. *Daldinia vernicosa* is usually associated with burnt substrates but apparently always of *Ulex*. This is not a common fungus, although probably widespread, and possibly confined more to base-rich areas of Britain.

Fomes fomentarius featured prominently in the archaeological material from Flixton and Seamer near Scarborough where a lake-side Mesolithic village was excavated. Here the fungus was evidently growing on *Betula* (Corner, 1950). Similar material from a Swiss lake village, now in the Hunt Museum, Glasgow, has been examined and found to be of equivalent age (Watling, unpublished data); similar specimens have been described by Göpfert (1976). It is interesting to speculate on the use, if any, to which the fruit-bodies were put; certainly it is used today to keep fires glowing at night in areas in Europe where timber is at a premium, and Ramsbottom (1953) lists numerous uses of this fungus in folk-custom. Did the lakeside settlers use *Fomes* for tinder or, as in central Europe today, to make poor quality felt?

Only recently Frank Murgatroyd of the Halifax Scientific Society handed me material of this same fungus from a deposit near the old Tag Lock at Cromwell Bottom in the Caldervale between Elland and Brighouse. It occurred embedded in a thin layer of exposed blue clay with gravel on top and about 2.95 m of soil and silt below. The deposit ranges from Boreal Zone VI to Sub Boreal Zone VII b, and includes remains of several plants no longer found in the district *(Lycopodium selago, Cochlearia alpina)*, various potamogetons, *Cornus sanguinea* and the moss *Antitrichia curtipendula*, which has a distinctly northern and contracting distribution in Britain today.

Examination of fungi preserved in archaeological sites is a very exciting extension of our study, and throws new light on the part played by *Fomes* and similar fungi in man's early life-

style. The finding of puff-balls at Vindolanda (Watling and Seaward, 1976), Skara Brae, (Watling, 1975), etc., has deepened our curiosity; *Bovista nigrescens* is a further noteworthy find in excavations at Stanwick Moor in Yorkshire (Wheeler, 1954).

Undoubtedly several fungi have been introduced into the country; some examples are obvious, e.g. *Leucocoprinus birnbaumii* (syn. *Lepiota lutea*) which occurs spasmodically in glasshouses, plant pots and flower boxes. Others are less obvious and some have become so naturalised it is hard to believe they are aliens, e.g. *Suillus grevillei* (= *Boletus elegans*) and *S. aeruginascens* introduced with *Larix*. Such introductions are apparently occurring all the time; recently I was shown a colour transparency of what is undoubtedly *Suillus placidus* growing at Bedgbury, the first British record. *S. placidus* is a common North American fungus described from there by C. H. Peck as *Boletus albus* but the epithet 'placidus' takes precedence as, having been introduced into Europe with 5-needled pines, it was named from there three years before Peck's publication. Is *Tremiscus*, mentioned earlier, a parallel introduction? It has, it is true, recently been recorded from the Midlands, and is apparently increasing its sites there and is probably to be expected in the Wigan area judging from a transparency I received from E. Soothill. Certainly the refinding of it in V.C. 62 by W. G. Bramley this year is of particular interest. Is the recent finding of *Clavicorona taxophila* under *Taxus baccata* in both north and south England also an indication of the fungus spreading after introduction or has it simply been overlooked? This trumpet-shaped fairy-club fungus has been found by J. B. Hindley *(pers. comm.)* in two sites in Wiltshire, at one regularly since 1970, and by myself at Challon Hall wood near Silverdale this year. In 1976 Mrs. Pat. Livermore sent me material from another locality at Silverdale, and this year added two more sites. It is known from Ireland (Colhoun, 1952) and France, although typical of North West America (Corner, 1967, 1970).

Conversely there are species which are common and widespread in Europe (e.g. *Albatrellus ovinus*) and frequently illustrated in popular continental accounts, but which have never found their way into the British Isles. Is the limiting factor climatic, edaphic or inability to migrate after the ice retreated, and therefore historic?

Do records of fungi in Yorkshire give a faithful picture? This is the perennial question concerning mapping schemes and is particularly apposite to the documentation of larger fungi as records are based on the appearance of a fruiting body. Thus *Strobilomyces* has very probably been present in the area of North Dean Wood for over half a century but has fruited only in autumns following exceptionally warm summers, i.e., the early part of the century and the autumns of 1975 and 1976. How can you record the presence of a fungus when it does not fruit? In the case of *Strobilomyces* it did fructify and could then be recorded, but many larger fungi are growing quite happily but only vegetatively.

Melanophyllum echinatun is by contrast a rather indistinct fungus; could it be under-recorded because it is passed over in the field or because in the laboratory the more colourful species are given precedence in identification, the drab species being left until they have perhaps wilted and are commencing to decay?

The records of *Porphyrellus pseudoscaber* are widely scattered but those from Yorkshire are worth considering critically. In the *Fungus Flora of Yorkshire* (Massee and Crossland, 1905) the species is recorded from three localities, one in each of the vice-counties, NE 65, SE 63 and MW 62, but in the early 1950s it was found in about a dozen localities in the Halifax Parish. Calderdale has attracted the attention of a fanatical band of interested amateurs since 1895, so one would have expected it to have been recorded if it had been present. Or is it that, with the modifications wrought by the woollen industry, the woodland valleys on Coal measure and Millstone grit deposits offer a favourable ecological niche unavailable elsewhere? It is incredible to appreciate that this same fungus still occurs in the twentieth century in Woodhouse Wood, near Halifax in the same place where Bolton noted it in 1788 (Watling, 1966).

Of course this account is only a beginning and no one would pretend it in anyway represents a final picture. Rather it is one to excite enthusiasm for further advance now the pitfalls have been revealed. In Europe there is hope of filling the gaps in our knowledge, but with the cross-off card system in Britain we have a good chance of achieving more far-reaching goals. The direction for the future should be towards a more critical analysis of the ecological

preferences of particular species. How little extra work is required on a foray to note the habitat, etc., and this could ultimately add a considerable amount of information for the purposes of the final assessment. If a specimen is worth hours spent in identification why not ensure the record is open to future mycologists by documenting it as fully as possible! Belgian workers have shown how a mycosociology can be constructed, studies which culminated in Darimont's publication 'Recherches Mycosociologiques dans les Forêts de Haute Belgique' (1973) which will undoubtedly have far-reaching effects.

An ecological analysis at the apparent boundaries of distribution of a species would be of great interest but should possibly be carried out at a much later stage in our studies. An even later stage would entail looking at the world distribution of selected species which is, for various reasons, almost impossible at the moment. It is true some species are cosmopolitan and of ubiquitous occurrence but most determinations of species abroad have been based either on material sent to mycologists working in Europe or on attempts at identification by mycologists in situ using European literature. The very nature of the dicaryotic life-cycle of the larger fungi leads to unexpected paths of evolution, which makes those organisms very much less conventional, and more difficult to study — a sobering thought with which to conclude.

Yorkshire, as one can see, possesses a vast 'library' of information not only on fungi but on the other components of the flora in addition to the fauna. Much of this information has been accumulated by amateur workers and it is through their earlier activities that I have been able to prepare this account. I am therefore deeply indebted to them. In the future, although the Yorkshire Naturalists' Union should monitor any threats to natural environment, it should also, whenever possible, guarantee that natural history is continued in the county as repayment to the memory of the early workers for their hard work. Perhaps one way of doing this is to encourage everyone in the Union to offer at least a portion of their knowledge to young interested persons so ensuring a continuation into the future.

Acknowledgements

My thanks are offered to my family and to Mrs. Norma Gregory my assistant at the Royal Botanic Garden, for their help in gathering the raw data and preparing maps, to W. G. Bramley for answering so many queries and companionship on so many collecting trips, and to Dr. M. R. D. Seaward and Mr. A. Henderson for their helpful criticism of the draft manuscript. It is my great pleasure also to thank the Halifax Scientific Society with whom I commenced my studies in natural history and all the members of the Union's Mycological Committee for their help and company over the many years I have attended forays in the county, particularly Dr. John Grainger, who urged me to take up fungal ecology, and A. C. Collinge, former officer of the Union, who introduced me to the Union's activities and persistently encouraged my early enthusiasm for cryptogams. I can only hope that the results of this paper justify such generous help and interest.

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BOOK REVIEWS

The Natural History of Selborne by **Gilbert White**, with a preface by **Lord Selborne** and an introduction by **David Attenborough.** Pp. x + 150. Shepheard-Walwyn, London. 1977. £9.95.

All that there is to be said about the Rev. Gilbert White has already been said. Although this is the umpteenth edition of White's famous work, first published in 1789, it is a particularly attractive one. The text of the Letters for this Gilbert White Museum Edition has been reproduced from the 1900 Macmillan edition, but with two pages of the original to a single page and a fully revised and reset index.

The illustrations pleasantly combine the old and the new, with engravings taken from Thomas Bewick's *British Birds*, and ten specially commissioned drawings of great charm and delicacy by Frederick Marns. (Incidentally four of these drawings, entitled *The Selborne Drawings of Frederick Marns*, are available from the publishers as full-size prints in their own portfolio together with descriptive notes — price unknown.)

Both printers (The Scolar Press, Ilkley) and publishers are to be congratulated on this well-designed volume.

M.R.D.S.

Pennine Flowers by **J. E. Duncan** and **R. W. Robson.** Pp. 96, with 15 line drawings and 11 photographs. Dalesman Publishing Company. 1977. £1.20.

The aim of the book is to supply some basic knowledge to assist the reader to explore the Pennines and discover the wild flowers of the area for himself. In a chapter headed 'Hints on identification' there is a very useful section on the characteristic plants of acid moorland. However, in the corresponding section on limestone grassland, which is far richer in species, only those plants with white flowers have been selected. Under the heading 'Some distinctive plants' forty species are considered at length, this section including both common and local species occurring in a variety of habitats. The general policy is to assist the reader to find plants by giving habitat information, but this information is not given for the Orchids and may have been withheld in the interests of conservation. Chapters on spore-bearing plants, critical species, sedges and grasses encourage the reader to make at least a beginning in tackling these groups. At the end of the volume a useful check-list of 462 selected species is provided together with information on soil type and whether the species occurs in the northern, central and southern section of the area.

In addition there are very readable and informative background chapters on geology and both the history of the vegetation and its present distribution. There is also a section on folk lore incorporating information gleaned locally. There are suggestions of localities to visit, with the stress on those places for which further information is readily obtainable.

Most botanists will read this book with interest, but it will be particularly valuable to the inexperienced field worker and the visitor. The book undoubtedly meets a real need and there should be a demand for it.

E.C.

Britain's Rarest Plants text by **E. A. Ellis, Franklyn Perring** and **Roland E. Randall.** Pp. 32. Jarrold Colour Publications, Norwich. 1977. 40p.

Picking Wild Flowers text by **David McClintock, Franklyn Perring** and **Roland E. Randall.** Pp. 32. Jarrold Colour Publications, Norwich. 1977. 40p.

British Wild Orchids by **Heather Angel.** Pp. 32. Jarrold Colour Publications, Norwich. 1977. 40p.

These are inexpensive but nevertheless well produced little books. They must be described as essentially picture books due to the generous allocation of space to illustrations, and their initial impact owes much to this wealth of impressive colour photographs. The use of so much illustrative material does not overshadow the written content however, which although brief, is both accurate and informative.

Britain's Rarest Plants and *Picking Wild Flowers* fulfil a useful function and should be welcomed by the various bodies involved in conservation as cheap and attractive educational devices. They describe, respectively, those plants which should on no account be picked, including those protected by law, and, those which may be picked if locally plentiful. These books could be usefully employed wherever natural history or biology is taught.

British Wild Orchids, although not comprehensive, provides an interesting introduction to these handsome and, to many people, unfamiliar plants. Heather Angel's photographs are of course superb and generally well reproduced.

P.J.S.

The Rain Forests of Golfo Dulce by **Paul H. Allen.** Pp. xvii + 417, including 34 plates and 25 line drawings. Stanford University Press. 1977. $25.00.

This is a re-issue of the 1956 edition of Allen's valuable contribution to our knowledge of lowland tropical rain forests in Latin America, especially Costa Rica. The present work has a new foreword by Peter H. Raven which incluues biographical information on and an appreciation of Paul Hamilton Allen who died in 1963. The book contains physiographical and ecological data, detailed keys, an alphabetical index to the families, genera, species and common names (with extensive taxonomic notes), utilization lists, and a glossary.

A REVIEW OF HOUSE MARTINS (*DELICHON URBICA* L.) IN PART OF SOUTH MANCHESTER, 1975

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INTRODUCTION

The status of the House Martin in Britain over the last forty years has been the subject of some discussion. Parslow (1967–68) suggested that there may have been a decrease in numbers, but that the evidence was not conclusive. A number of pilot studies have been carried out (Hollom, 1930; Alexander, 1933; Cramp and Ward, 1934; Cramp, 1950 and Bouldin, 1959); even a ten year survey (Bouldin, 1968) failed to show any definite trend, and certainly did not suggest a decrease.

In Central London, Cramp and Gooders (1967) demonstrated an increase in House Martins over the seventeen years since the previous survey (Cramp, 1950). An earlier survey (Cramp and Ward, 1934) invited a similar kind of investigation in South Manchester.

Figure 1. Map of survey area; situation of nests in 1933 (after Cramp and Ward, 1934).

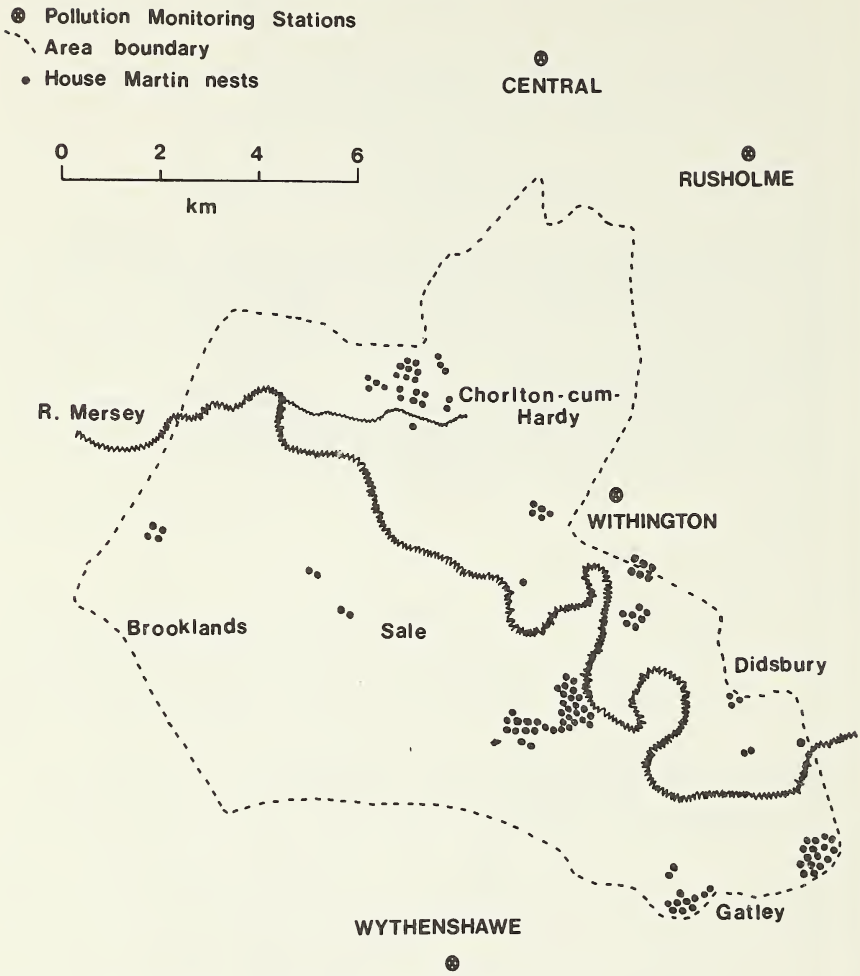

Figure 2. Map of survey area; situation of nests in 1975.

METHODS

The area was the same as that covered in 1933, about 32 square kilometres. It was surveyed on a bicycle, initially by visiting sites recorded as occupied in 1933 (Cramp and Ward, 1934), and then investigating the remaining areas.

Colonies were located during nest construction, in June and July, and checked at the beginning of September. The numbers of House Martins seen in each area provided a rough indication that all the nests had been located, and that searching could be terminated. It was not possible to ascertain whether all the nests were occupied, thus all complete nests with no

sign of House Sparrow *(Passer domesticus)* usurpation were counted. Cramp and Ward (1934) also worked on this assumption (S. Cramp, *pers. comm.*).

The House Martin 'colony' is a rather nebulous concept; its usage here will be reserved for all the nests on one building. Although Cramp and Ward (1934) give no precise definition, it seems likely that they used the same criterion. L. E. Bouldin (pers. comm.) defines a 'colony' as "all the nests on one building, as well as nests on adjacent buildings, where the buildings were not separated by a change in the six figure grid reference". The 'colony' criterion used in this work means that 'colony' size may be a function of the size of the buildings in the area, but this limitation is no worse than the 100 metre separation implicit in L. E. Bouldin's 'colony' concept. Indeed the present system has the advantage of a simple and consistent field measurement of 'colony' size; note that it accentuates the number of smaller 'colonies' present.

Lind (1960) notes that the House Martin 'colonies' (?) are mostly situated in groups, and that one could regard neighbouring nesting places as one large, but loose 'colony'. A glance at Figs. 1. and 2. will show that there may be ten or more such groups in the present survey, compared with five or more in 1933.

Results

Distribution of nesting sites

The maps (Figs. 1 and 2) show the distributions in 1933 and 1975, while the analysis of colony size in Table I reveals that there were 70 nests in 1933, and 120 in the present survey. An obvious feature in both surveys is the way the colonies straddle the R. Mersey. This is probably because of the abundance of food and nest-building resources in the flood plain.

	1933			1975		
Colony size	No. of colonies	No. of nests	% of total nests	No. of colonies	No. of nests	% of total nests
1 nest	15	15	21.4	17	17	14.2
2 nests	8	16	22.8	9	18	15.0
3 nests	3	9	12.9	4	12	10.0
4 nests	3	12	17.1	3	12	10.0
5 nests	2	10	14.3	2	10	8.3
6–10 nests	1	8	11.5	6	40	33.3
11–15 nests	0	0	0	1	11	9.2
TOTAL:	32	70		42	120	

Table I Size of House Martin *(Delichon urbica)* colonies for 1933 (Cramp and Ward 1934) and 1975, in an area of S. Manchester.

Table I shows a 71% (50 nests) increase in the number of nests in the area, but the number of colonies has risen by only 31% (10 colonies). Thus both average colony size and the number of colonies have increased since 1933. The distribution of colonies has also changed, the species now being more evenly distributed along the Mersey valley; care must be taken when trying to assess these changes, since they are probably an annual phenomenon. It is worth noting that almost all the colonies present in 1933 seem to be still active. Several new colonies on the north bank of the Mersey suggest a tentative spread towards the urban centre.

Density

The nesting density of House Martins has often been estimated (Table II). Figure 3 shows how an estimate may be related to the size of the survey area; the smaller surveys often give disproportionately large densities, perhaps because they pick upon particularly favourable areas. This point is illustrated (see Table II) by Boyd (1936), who included some small surveys, with low House Martin densities, because his areas were chosen for their Swallow *(Hirundo rustica)* content. The graph indicates that the minimum suitable area for a valid density evaluation is around 30 km², and that the 'average' density is about 2 nests per km²,

Author	*Size of survey area*			*Density*		
	Sq. miles	1000 acres	Sq. km.	Nests per sq. mile	Nests per 1000 acres	Nests per sq. km.
Hollom 1930	4.0		10	26.0		10.4
Alexander 1933	12.0		31	27.08		10.5
	12.0		31	26.92		10.4
	44.0		114	9.82		3.8
	44.0		114	8.91		3.4
Cramp and Ward 1934	12.25		32	5.71		2.2
Bouldin 1959		5.0	20		13.0	3.2
		3.0	12		37.3	9.2
		10.5	43		4.94	1.2
		13.5	55		6.46	1.6
		18.0	73		2.9	0.7
		50.0	203		7.36	1.8
Bouldin 1968		338	1369		7.2	1.8
		338	1369		7.7	1.9
		338	1369		8.3	2.1
		338	1369		8.3	2.1
		338	1369		8.1	2.0
		338	1369		7.6	1.9
		338	1369		9.0	2.2
Present Survey			32			3.6
Cramp 1950	24.25		63		3.4	0.8
Boyd 1936		0.935	4			1.0
		32.0	130			0.7
		2.717	11			1.6
		1.515	6			0.3
		4.16	17			8.9
		1.739	7			4.3
		7.68	31			0.7
		1.2	5			5.6

This table is constructed using the conversions: 1 square mile = 2.59 km²; 1000 acres = 4.049 km².

In the case of Boyd (1936), the figures given are for breeding pairs, which are assumed to have been obtained from a nest census.

Table II Figures from various surveys for House Martin nesting density, and survey area size.

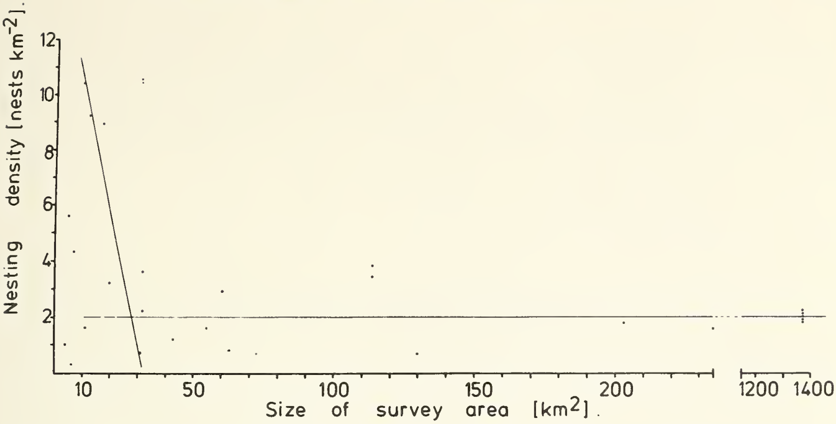

Figure 3. House Martin *(D. urbica)* nesting density as a function of the area surveyed.

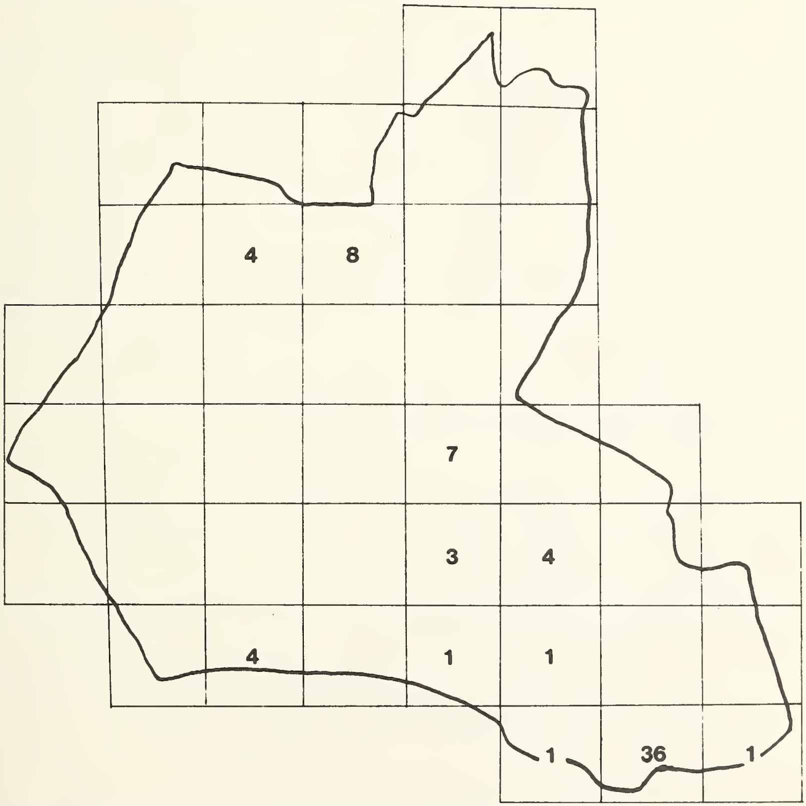

Figure 4. Density of House Martins *(Delichon urbica)* in an area of S. Manchester, 1933 (after Cramp and Ward, 1934). One square = 1 km^2.

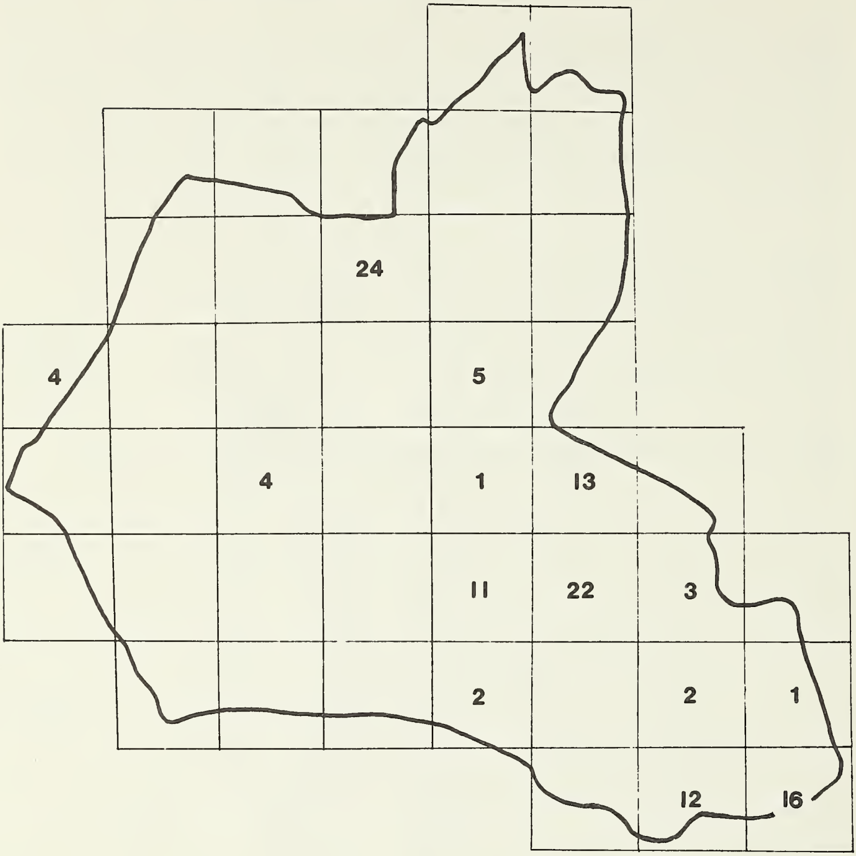

Figure 5. Density of House Martins *(Delichon urbica)* in an area of S. Manchester, 1975. One square = 1 km^2.

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variation occurring due to the suitability of the habitat. Nesting density at a single location (Alexander, 1933 and Bouldin, 1968) remains remarkably constant in successive years, compared to the differences observed between surveys.

The maps (Figs. 4 and 5) show House Martin densities in 1933 and 1975. They are based upon a one kilometre grid, for comparability; Fig. 2 of Cramp and Ward (1934) has been re-plotted as a compromise between the density and distribution maps given in that work. The overall nesting density of the area in 1933 was 2.2 nests per km^2; this has risen to 3.6 nests per km^2. An increase in density has occurred in most of the grid squares, but nowhere in the present study is the density as high as that found in Gately during 1933.

Colony size and distribution

It would appear (Table I) that with the increase of nesting House Martins in the area, a greater proportion of the individuals are to be found nesting in larger colonies, i.e. they are now more gregarious.

There is an evident correlation between House Martin distribution and water, since 85.7% of the colonies were within 400 m of a major water supply. The significance of this factor in controlling distribution is dubious, since both nest building material and water may be obtained from puddles and gutters (Simms, 1973). Bryant (1973, 1975) has shown that young House Martins are mainly fed on ants, aphids, and schizophoran Diptera, none of which are particularly aquatic. It may be that major water sources and 'unkept' land coincide, so that the food source from the 'unkept' land is the major factor controlling distribution.

Discussion

The change of House Martin status in the area since 1933

It is important to establish that the change in population between 1933 and 1975 is genuine. The 1933 survey (Cramp and Ward, 1934) was carried out in in June and July, but House Martins may still have young in the nest during October (Oakes, 1953). Thus their survey could have missed some of the later immigrants. This would not have caused a significant error, since the 1975 survey was carried out in June and July initially, and only a small increase was found when it was repeated in September.

It is possible that the 1933 survey coincided with a 'low' House Martin year, and 1975 with a 'high' one. The 1933 situation can never be discovered, but a repeat survey in 1976 has shown that there were at least least 167 House Martin nests in the area (cf. 120 in 1975), though this figure includes a colony (of 12 nests) not discovered in 1975. Thus it is suggested that the change since 1933 genuinely represents an increase in the breeding population.

If the House Martin has increased in the area it is possible that other insectivorous species have shown a similar trend. The Swift *(Apus apus)* was absent as a breeding bird within a 4 mile (6.4 km) radius of the city centre in 1962 (Smith, 1962); in 1975, several were noted breeding in Fallowfield, 4.5 km from the city centre (Town Hall).

Causes of the change in status

Consideration of the factors affecting House Martin distribution, and how they have altered in the area since 1933, may explain the increase. All the nests found in the present survey were on buildings judged to have been present in 1933. Many of the older houses have eaves with sprocket pieces which provide good support, and shelter from the rain, for the nests; 87% of the nests were found under this type of eave. Since eaves are rare upon constructions built in the area since 1933, and all the nests were on old buildings, the House Martin increase is not due to the availability of 'new' nest sites.

The significance of proximity to water has already been mentioned, and is thought to be important only because of its coincidence with vegetation stands; it seems unlikely that the amount of 'unkept' land has increased since 1933.

The most obvious environmental change in the area since 1933 is an improvement in atmospheric conditions. It was in 1938, that the National Smoke Abatement Society in Manchester suggested the introduction of smokeless zones in the city. Not until 1st May 1952 did the first of these measures come into force. The first quantitative data available are for 1959, and the decreases since then in smoke and sulphur dioxide concentrations at four stations (mapped on Fig. 2) are shown in Figures 6 and 7. The sulphur dioxide concentrations have dropped by 51% (Central), 38% (Rusholme), 59% (Withington), and 23% (Wythenshawe), while the smoke concentrations have been reduced by 80% (Central), 79% (Rusholme) 86% (Withington) and 68% (Wythenshawe).

Sulphur dioxide penetrates plants via the stomata and then destroys the tissues, while heavy deposits from smoke pollution on the leaves reduce the transpiration rate by up to one tenth that of a non-affected leaf (Mellanby, 1967). These effects on the plant must surely affect the insects living on them, especially the aphids which suck plant juices. Unfortunately, there is no direct evidence of how air pollution affects the food chain.

Besides the possible indirect effects of air pollution on the House Martin food chain, there

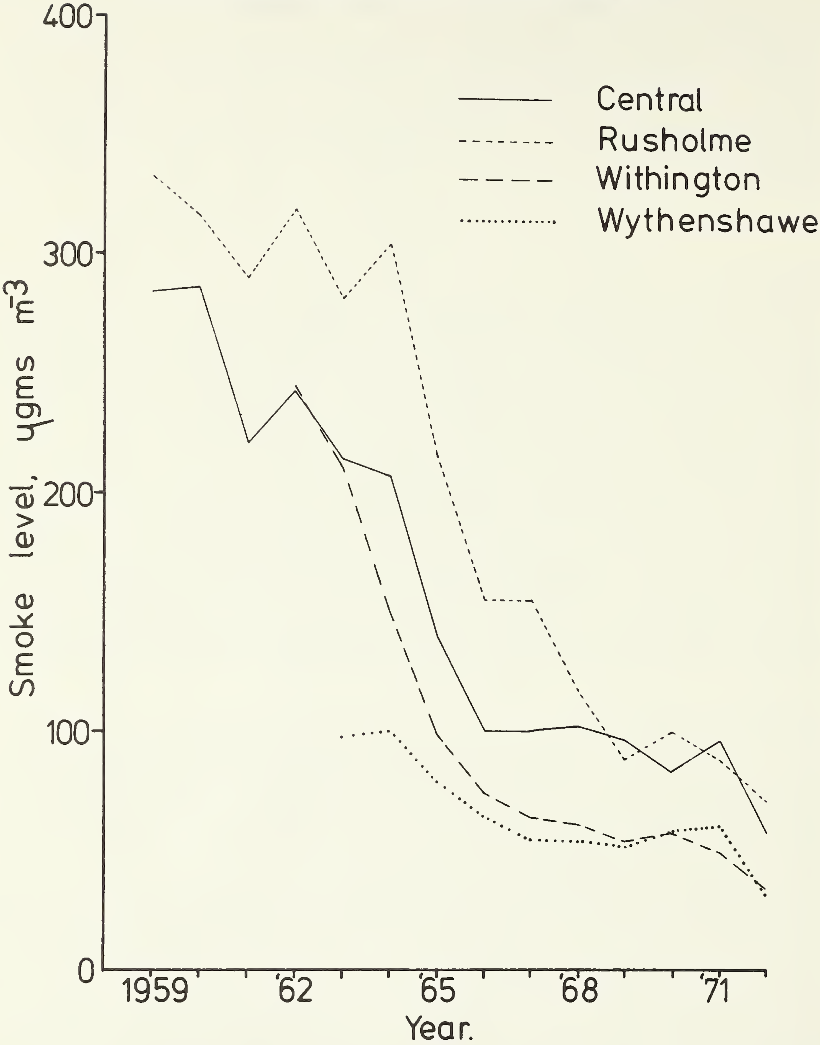

Figure 6 Daily average smoke levels in S. Manchester. 1959–72.

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may have been a more direct effect. Severe smog causing death by asphyxia has been recorded in Sparrows *(Passer domesticus)* and Starlings *(Sturnus vulgaris)* (Dowsett, 1960). It is possible that foul air in Manchester City Centre before the Clean Air Acts limited the Swift and House Martin distribution. If the House Martin roosts on the wing (Buxton, 1975) like the Swift, then the feathers may have become soiled quickly and the respiratory system possibly damaged in smog areas. Note that the Swift was not present within four miles of the city centre until after 1962, when atmospheric conditions improved rapidly (Figs. 6 and 7).

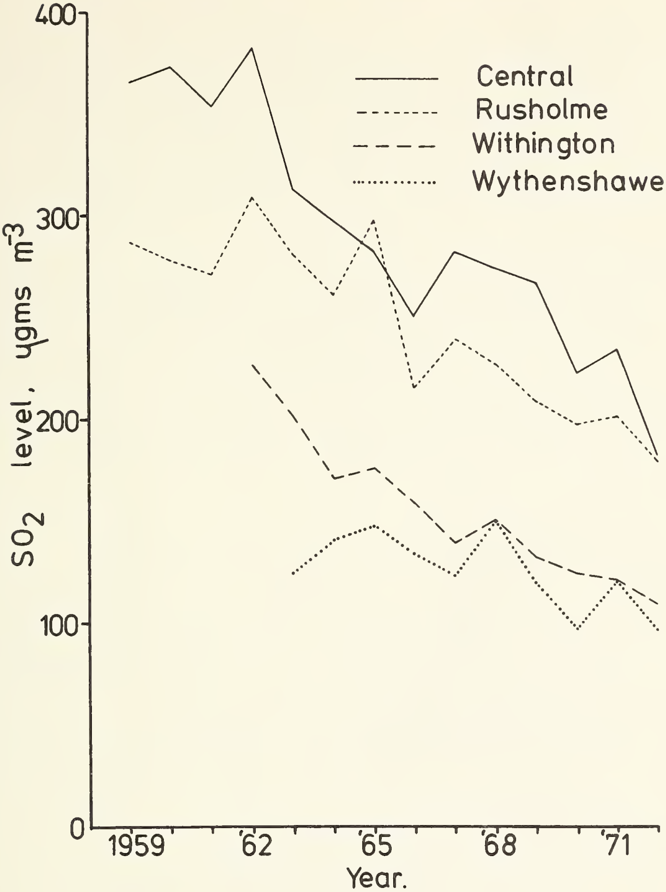

Figure 7 Daily average sulphur dioxide levels in S. Manchester, 1959–72.

Cramp and Gooders (1967) have suggested that reduced smoke concentration may have been the reason for House Martins moving further into London. While it cannot be proven, it seems very likely that the increase in the House Martin population of South Manchester, since 1933, has been due to the improvement of atmospheric conditions.

Acknowledgements
I am grateful to Mr. E. W. Foskett, Director of Environmental Health in Manchester for supplying the information on air quality, and to Mrs. A. P. Williams for typing the manuscript. Dr. D. W. Yalden very kindly supplied the 1976 census figure, and gave invaluable advice during the drafting of the paper.

SUMMARY

The census of House Martins in South Manchester during 1933 was repeated in 1975. The breeding population had increased by 71% (50 nests); this had resulted in an increase both of colonies and their average size.

The survey covered 32 km², in which the density rose from 2.2 nets per km² (1933), to 3.6 nests per km² (1975). These figures were compared with those obtained in other surveys, and it was seen that the survey area was just large enough to produce unbiased results.

The provision of water near to colonies, and the availability of 'new' nest sites, were considered unlikely to account for the increase. A decrease in atmospheric pollution is suggested as the main factor responsible for the increase of House Martins in the area.

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LICHEN FLORA OF THE WEST YORKSHIRE CONURBATION — SUPPLEMENT I (1975–1977)

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Numerous additions and corrections to the published lichen flora (Seaward, M. R. D., 1975, *Proc. Leeds Phil. & Lit. Soc. (Sci. Sect)* **10**: 141–208) have been noted during the past three years as a result of the examination of further herbarium collections (mainly Bolton — BON, British Museum (Natural History) — BM, Edinburgh — E and Keighley — KGY), a more detailed literature survey (see Hawksworth, D. L. and Seaward, M. R. D., 1977, *Lichenology in the British Isles 1568–1975*), and further fieldwork, mainly by Mr. P. M. Earland-Bennett, Mr. A. Henderson, Dr. C. J. B. Hitch and myself.

The distributional data presented in the following list of taxa are based on recording units (figure 1) devised by Seaward *(op. cit.)*, which can be cross-referenced to the national grid mapping scheme (figure 2).

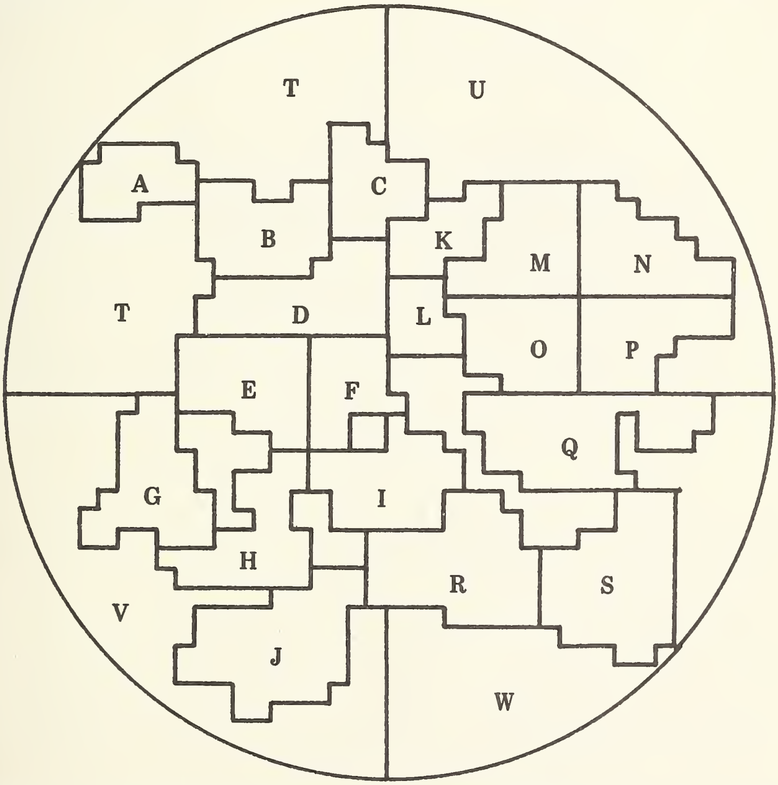

Figure 1. West Yorkshire conurbation recording units: the area covered (= 1257 km²) is with a radius of 20 km of grid reference 44/200.300. The principal towns, villages, villages, etc. and the size of each recording unit are given in Table I.

Recording Unit	*Principal Towns, Villages, etc.*	*Area (km^2)*
A	Keighley, Braithwaite	19
B	Bingley, Shipley, Baildon	31
C	Guiseley, Yeadon, Rawdon, Menston	23
D	N. Bradford, Allerton, Idle, Apperley	36
E	S. W. Bradford, Shelf, Queensbury	34
F	S. E. Bradford	21
G	Halifax, Sowerby Bridge	34
H	Brighouse, Elland	31
I	Cleckheaton, Liversedge, Heckmondwike	32
J	Huddersfield, Almondbury	49
K	Horsforth, Calverley, Cookridge	19
L	Pudsey, Farsley	14
M	N. W. Leeds	32
N	N. E. Leeds	32
O	S. W. Leeds	29
P	S.E. Leeds	29
Q	S. Leeds, Rothwell, Morley	48
R	Dewsbury, Batley, Mirfield	47
S	Wakefield, Ossett, Horbury, Stanley	47
		607
T	Harden, Cullingworth, Rombalds Moor, Ovenden, Ilkley, Burley, Hawksworth, Baildon Moor, Denholme, Flappit	178
U	Otley, Bramhope, Harewood, Saw Wood, Eccup, Farnley, Thorner, West Garforth, Washburn Valley, Pool	153
V	Luddenham, Mixenden, Mytholmroyd, Norland, Ripponden, Slaithwaite	161
W	Normanton, Flockton, Netherton	157
		1256

Table I. Principal towns, villages, etc. and size of each West Yorkshire conurbation etc. and the size of each recording unit (see Figure 1).

Acarospora fuscata (Nyl.) Arnold
First record = Carrington, 1862 (as *A. cervina*).

A. heppii Naeg. ex Körb.
Earland-Bennett, 1975. G, V. Calcareous. Rare.

A. smaragdula (Wahlenb. ex Ach.) Massal.
First record – Baker, 1863.

Alectoria chalybeiformis (L.) Gray
Hailstone, n.d. (in Whitaker, 1805); cf. Lees, F. A. 1888, *Flora of West Yorkshire.*

Arthroraphis citrinella (Ach.) Poelt
Hitch, 1976. T. On mortar between siliceous coping stones. Rare.

Bacidia chlorococca (Stiz.) Lett.
Add B, O, Q. Increasing and/or overlooked in suburban and urban areas.

B. egenula (Nyl.) Arnold
Earland-Bennett and Henderson, 1976. U. On siltstone rock at edge of pool. Rare.

B. lignaria (Ach.) Lett.
See *Micarea lignaria* (Ach.) Hedl.
B. umbrina (Ach.) Bausch
Add C, P.
B. violacea (Crouan ex Nyl.) Arnold
Henderson, 1975. U. On bedded stone rubble of ditch embankment. Rare.
B. sp. (see *Naturalist* **101**: 67)
Henderson, 1974. Q. U. On mortar of roadside wall and on siliceous stones. Uncommon.
Baeomyces rufus (Huds.) Rebent.
Add (B).
Biatorella moriformis (Ach.) Th. Fr.
Henderson, 1975. U. Lignicolous. Rare.
Caloplaca cerina (Ehrh. ex Hedw.) Th. Fr.
Hailstone, n.d. (in Whitaker, 1805). (B).

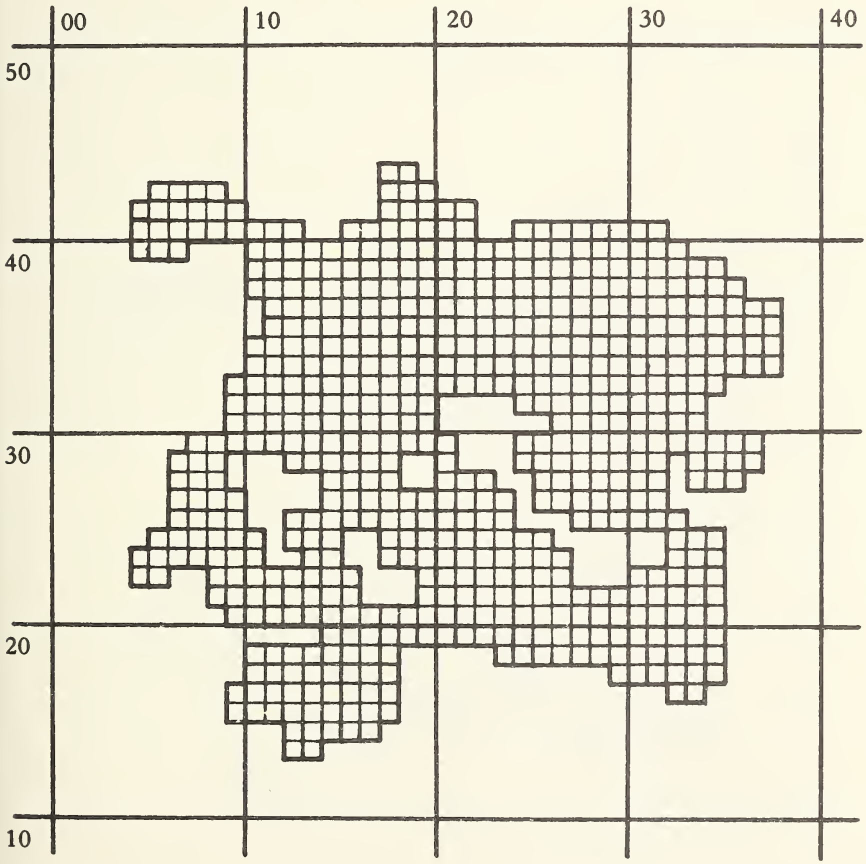

Figure 2. West Yorkshire conurbation: the highly urbanized areas (= 607 km²) are expressed as 1 km² recording units of the national grid.

C. citrina (Hoffm.) Th. Fr.
Add P.
C. holocarpa (Hoffm.) Wade
Add C.
Candelariella vitellina (Hoffm.) Müll. Arg.
Add I.
Catillaria chalybeia (Borr.) Massal.
Add V.
Also recorded from cement.
C. prasina (Fr.) Th. Fr.
See *Micarea prasina* Fr.
Cladonia chlorophaea (Flörke ex Sommerf.) Spreng.
Add K.
C. coniocraea (Flörke) Spreng.
Add H, P.
C. conistea (Del.) Asah.
Add A.
C. crispata (Ach.) Flot.
var. *cetrariaeformis* (Del. ex Duby) Vain.
Crosby, 1975. B, H. T. U. On acid soils, usually amongst *Calluna*. Uncommon, probably overlooked.
C. fimbriata (L.) Fr.
Delete (P), add H, P.
C. furcata (Huds.) Schrad.
Add (A), B.
C. impexa Harm.
First record = Carrington, 1856 (in herb. E).
Seaward, 1975. T. On acid heathland. Uncommon.
C. polydactyla (Flörke) Spreng.
Add B.
C. scabriuscula (Del. ex Duby) Leight.
Add U. On soil at foot of slope. Rare.
C. squamosa (Scop.) Hoffm.
var. *squamosa*
First record = Carrington, 1856 (in herb. E).
C. subulata (L.) Web.
First record = Seaward, 1972.
Add H, U, W. Occasional.
C. zopfii Vain.
Carrington, 1856 (in herb. E). (T).
Collema crispum (Huds.) Web.
Delete (T), add T, U. Calcareous walls. Uncommon.
C. tenax (Sw.) Ach.
var. *tenax*
Henderson, 1976. U. Amongst mosses on thin soil over asphalt. Rare.
car. *ceranoides* (Borr.) Degel.
Henderson, 1976. U. Amongst mosses on asphalt. Rare.
Cornicularia aculeata (Schreb.) Ach.
Delete (B), (U), add B, U.
C. muricata (Ach.) Ach.
First record = Carrington, 1856 (in herb. E).
Hypogymnia physodes (L.) Nyl.
Add C, K.
Rarely corticolous in urban areas.

Lecania nylanderiana Massal.
Henderson, 1975. U. On mortar. Rare.

Lecanora badia (Hoffm.) Ach.
var. *badia*
Delete (U), add U.

L. cinerea (L.) Sommerf.
Modern records are in fact *Bacidia umbrina*; delete T, add (T).

L. conizaeoides Nyl. ex Cromb.
Almost certainly present in all squares; the distribution map (figure 3) is included as an indication of those areas critically surveyed to date.

L. muralis (Schreb.) Rabenh.
var. *muralis*
Add S. Rarely lignicolous.
For distribution within conurbation in 1977 see figure 4 (cf. Seaward, 1975, *op. cit.*, fig. 27).
var. *albomarginata* (Nyl.) Tomin
Add U. On siliceous stone. Rare.

L. polytropa (Hoffm.) Rabenh.
Add H.

Lecidea coarctata (Sm.) Nyl.
var. *coarctata*
See *Trapelia coarctata* (Sm.) Choisy
var. *ornata* (Sommerf.) Nyl.
See *Trapelia involuta* (Tayl.) Hert.

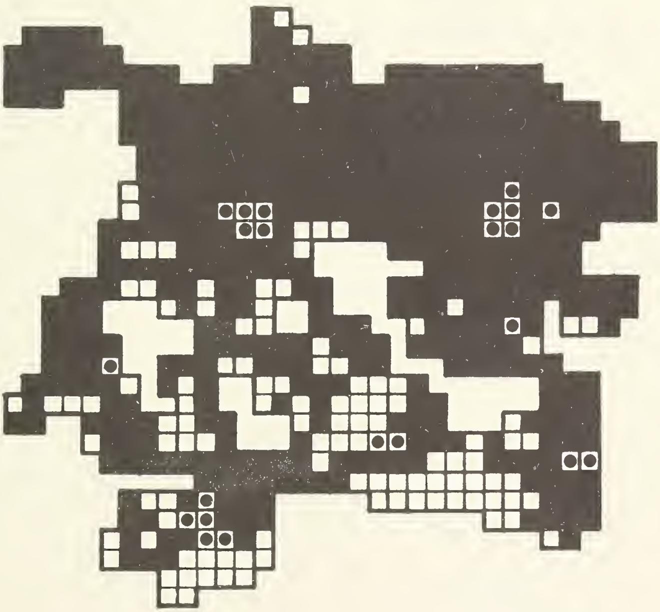

Figure 3. West Yorkshire conurbation: the distribution of *Lecanora conizaeoides* (rarity denoted by spots) reflects the 1 km² urban recording units so far investigated.

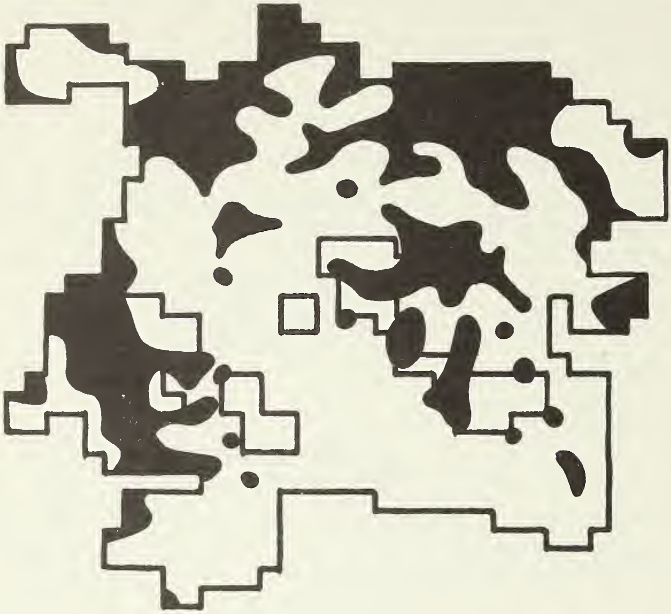

Figure 4. West Yorkshire conurbation: major distribution of *Lecanora muralis* in 1977.

L. erratica Körb.
Earland-Bennett, 1976. H, U. On siliceous stones. Uncommon.
L. scabra Tayl.
See *Lecidella scabra* (Tayl.) Hert. & Leuck.
L. semipallens Nyl.
Henderson, 1976. T, U. On siliceous stones. Rare.
L. stigmatea Ach.
See *Lecidella stigmatea* (Ach.) Hert. & Leuck.
L. uliginosa (Schrad.) Ach.
Add B.
L. vernalis (L.) Ach.
Delete; Soppitt record just outside defined area (figure 1).
Lecidella scabra (T. Tayl.) Hert. & Leuck.
Add M, *c.fr.* at this locality.
Rarely lignicolous.
L. stigmatea (Ach.) Hert. & Leuck.
Add B, C, E, P.
Leptogium plicatile (Ach.) Leight.
Add U. On mortar. Rare.
Micarea denigrata (Fr.) Hedl.
Henderson, 1976. U. On wooden fencing and siliceous stone. Uncommon.
M. lignaria (Ach.) Hedl.
Delete (U), add U.

M. prasina Fr.
Add M, T. Also on *Calluna*.
Mycoblastus sanguinarius (L.) Norm.
Add U.
Ochrolechia androgyna (Hoffm.) Arnold
Add M.
Opegrapha confluens (Ach.) Stiz.
Henderson, 1975. U. Shaded base of siliceous castle wall. Rare.
Parmelia glabratula (Lamy) Nyl.
subsp. *fuliginosa* (Fr. ex Duby) Laund.
Delete (T), add T.
P. incurva (Pers.) Fr.
Add U.
P. omphalodes (L.) Ach.
var. *omphalodes*
Delete (B), add B.
P. physodes (L.) Ach.
See *Hypogymnia physodes* (L.) Nyl.
P. sulcata Tayl.
Add U.
Peltigera polydactyla (Neck.) Hoffm.
First record = Richardson and Dillenius, n.d. (in Whitaker, 1805).
P. spuria (Ach.) DC.
Delete (T), add M, T.
Pertusaria corallina (L.) Arnold
Delete (U), add U.
Physcia grisea (Lam.) Zahlbr.
See *Physconia grisea* (Lam.) Poelt
P. orbicularis (Neck.) Poetsch
Add E.
Physconia grisea (Lam.) Poelt
Add G.
Placynthium nigrum (Huds.) Gray
First record = Lindsay, 1859 (p. 270, as *Pannaria triptophyllum* var. *nigra*). Add (C).
Protoblastenia rupestris (Scop.) Steiner
var. *rupestris*
Delete (T), add T, V.
Rhizocarpon lavatum (Fr.) Hazsl.
Earland-Bennett, 1975. V. On grit boulder in stream. Rare.
R. obscuratum (Ach.) Massal.
var. *reductum* (Th. Fr.) Eitner.
Henderson, 1975. U. On siliceous stone. Uncommon.
Rinodina exigua (Ach.) Gray
Add U.
Rarely lignicolous.
R. subexigua (Nyl.) Oliv.
Add B, H.
Sarcogyne regularis Körb.
Add K.
Sphaerophorus fragilis (L.) Pers.
Add (T).
Thelidium impressum (Stiz.) Zsch.
Earland-Bennett, 1976. V. On mortar. Rare.
T. incavatum Mudd
Add M.

T. mesotropum (Nyl.) A. L. Sm.
Delete 'cf.'.
Add M. On semi-shaded cement aggregate.

Trapelia coarctata (Sm.) Choisy
Add B, K.

T. involuta (Tayl.) Hert.
Add U.

Usnea florida (L.) Web.
Add (B).

Verrucaria muralis Ach.
Add B, C.

V. nigrescens Pers.
Add Q, V.

V. viridula
Add B, V. Also on weakly calcareous gritstone.

Xanthoria elegans (Link) Th. Fr.
Add B, U.

As a consequence of the above work, the West Yorkshire conurbation lichen flora can be summarized as follows: 303 lichen taxa have been reported from the area within 20 km of the centre of the conurbation, of which 5 are doubtful in the absence of supporting herbarium material, at least 34 are extinct in the area, and 161 have been recorded during the present survey (October 1967 — December 1977).

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MARY DALBY B.V.Sc., M.R.C.V.S.

Mary Dalby, a veterinary surgeon in Menston and Ilkley for over 30 years, died on 15 January 1978 after a long illness which her firm faith enabled her to bear with serenity and courage.

She joined the Union in 1958 and acted as Moss Recorder from 1965 to 1978. An active member of the British Bryological Society, she organised field meetings for them in Yorkshire. For the Yorkshire Naturalists' Trust she produced bryophyte records for several of the Reserves and other important sites. She became a member of the Wharfedale Naturalists' Society in 1951 and was its President for 1967–68.

Mary had an alert scientific mind and a deep appreciation of natural history from the broad view right down to the microscopic details of the bryophytes which she made her special study; she also enjoyed working on ecological problems. These qualities she brought to bear on promoting the work of the Wharfedale Society and perhaps her most far-reaching contribution was to initiate and organise the ecological survey of Olkley Moor from 1959 onwards. She was indefatigable both in her own work and in encouraging others to share in it, bringing out talents for natural history which members did not realise they had. Wherever her investigations led — in Yorkshire and further afield — her infectious enjoyment made it always a pleasure to botanise with her, whether on an ecological survey or painstakingly identifying and recording plants.

It was characteristic of Mary Dalby that she kept her bryological records for both the Union and the Wharfedale Naturalists' Society methodically and with careful attention to detail, so that those who follow can readily continue the work. She never lost her enthusiasm for botany; whenever she was well enough between treatments during the last year of her life she would be out on some botanical pursuit. The account below of her collections and publications epitomises the work she achieved during her 20 years' membership of the Union, a contribution of inestimable value.

Mary will be greatly missed by her many naturalist friends, most of all for herself — her constant support and encouragement, her keen sense of humour and delightful companionship. She always had respect for others and won the affection and esteem of all members who knew her. Our sympathy goes to her brother, the Reverend Francis Dalby, and to her friend, Miss Margaret Woods.

Joan E. Duncan

MARY DALBY BRYOPHYTE HERBARIUM

This collection of 3,323 packets of British bryophytes was presented by Miss Dalby to the City of Bradford Metropolitan Council's Arts and Museums Division shortly before her death. It had been agreed for some time that this important local collection should eventually come into the safe custody of the Bradford Museums, where it is available for reference and study. Miss Dalby's particular interest was in Yorkshire *Sphagna*, and these form an important part of the collection.

The collection consists of standard bryophyte packets, all with full data and housed in Miss Dalby's original storage units. The material was collected between 1957 and 1977, and complements Bradford's previous bryophyte material (Hartley, M. M. 1977, *Naturalist* **102**: 25–30) of over 5,000 specimens, collected between about 1850 and 1915, with a Yorkshire predominance. Current collecting by the present keeper, Natural Sciences, is taking place in connection with 1 km × 1 km grid square and site recording. The content of Miss Dalby's collection are as follows:

Yorkshire *Sphagna*	951 packets
Yorkshire Mosses	1,032 packets
Yorkshire Hepatics	411 packets
Non-Yorkshire British Mosses (including *Sphagna*)	654 packets
Non-Yorkshire British Hepatics	275 packets.

Miss Dalby also prepared up-to-date card indexes for her Yorkshire *Sphagna* and Yorkshire Mosses.

Miss Dalby's work in this field is also reflected in the Yorkshire Naturalists' Union moss records, which she completely reorganised and maintained. These records are now with the new recorder, T. Blockeel. The Wharfedale Naturalists' Society bryophyte records, which she also kept, are now held by that Society, and her 1 km × 1 km grid square records are held by the West Yorkshire Biological Data Bank.

Miss Dalby was a regular contributor to the *Naturalist*, being responsible for the Y.N.U. Annual Reports of Musci for the years 1965 to 1977, writing many of the Bryology Reports for Y.N.U. Excursions during the same period, and contributing the following papers:

Duncan, J. E. and Dalby, M. (1960) The vegetation of Swinsty and Fewston Reservoirs 1957–1959. *Naturalist*: 81–88.

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Margaret M. Hartley

BOOK REVIEWS

A Key to the British Fresh- and Brackish-water Gastropods by **T. T. Macan**, illustrated by the late **R. Douglas Cooper.** Scientific Publication No. 13 of the Freshwater Biological Association. 4th edition. 1977. 60p.

This is the fourth reprint of this well-known key to fresh and brackish-water gastropods. The only difference between this edition and the third edition published in 1969 (reviewed in the Naturalist for July-Sept. 1969, p. 108), is in the cover and a one page introduction which lists some of the changes in nomenclature which have taken place since that date.

It is a pity that the author found it unnecessary to include the brackish-water species *Hydrobia neglecta* Muus, and that he did not take the opportunity to bring up to date the

sections on ecology and distribution. It is a minor point, but it would also have been useful if he had pointed out, if only in a foot note, that *Planorbis leucostoma* and *Planorbis spirorbis* are now thought to be two distinct species.

It is a very different matter, however, to find that after nearly thirty years and four editions two of the figures are still incorrectly named. The illustrations on page 12, fig. 3d, labelled *Valvata cristata* are in fact *Planorbis crista*; *Valvata cristata* is not figured in the book at all. The figures of *Planorbis crista* on page 28, fig. 11c, are a variety of *Planorbis crista* known as var. *nautileus*. From a careful consideration of sections of the key it would seem that Macan had never seen specimens of *Valvata cristata* when he wrote the key and had in fact based it on the two forms of *Planorbis crista*.

On the whole, if basic errors of this type cannot be corrected after four editions, it would have been better had it not been reprinted at all.

A.N.

Seashells of the World by **Gert Lindner**, translated by **Gwynne Vevers.** Blandford Press, 1977. £4.75.

The quality of the 64 colour plates illustrating over 1,000 species of marine shells from all parts of the world, with their accompanying texts, is justification in itself for republishing this book in the English language. It was a very pleasant surprise to find that nearly 100 of these figures are of species known from the British Isles. Other books of this type, many of which have the same or similar titles, tend to confine themselves almost completely to the more exotic species found in the Indo-Pacific region.

The text of the book is mainly taxonomy, and although this will be of interest to some people, the only effect it will have on the general reader is to ensure that he or she does not read the book. As an example, the section on the Turbinidae, (Turban Shells) on page 39, is composed of 30 lines of print, 19 of which are taken up by lists of genera and subgenera. In the family Trochidae (Top Shells), on pages 35–38, this is taken to an extreme with 97 lines of print of which less than a dozen are readable. This type of text is very popular in Germany and for a book to be generally accepted it must cater for the collector of names. This type of information is readily available in such publications as the Treatise on Invertebrate Palaeontology, and I can see very few amateur naturalists being interested to such an extent in the inter-relationships of genera within a family.

I would like to recommend this book personally to all those who have even the slightest interest in tropical shells. I would also recommend that the interest is restricted to the very fine colour plates, the first 120 pages being of little use to the general collector.

A.N.

Guide to the Mammals of Britain and Europe by **M. Burton.** Pp. 256, with colour illustrations. Elsevier Phaidon, Oxford. 1976. £1.95.

An ecologically orientated field guide to European mammals. Less exhaustive than taxonomically-based guides (e.g. the similarly-named Collins guide by F. H. Van der Brink), but no less acceptable. The ecological approach provides interesting essays on habitats, mammal history etc. — something to read in the hide while you are waiting for the mammals to show up. Lurid but plentiful illustrations.

B.S.

The Dragonflies of Great Britain and Ireland by **Cyril O. Hammond.** Pp. 115, with 20 colour plates, 23 figures and 46 maps. Curwen Books, London. 1977. £9.75.

Recently would-be students of the dragonflies have been faced by the twin deterrents of lack of literature and an apparently declining population of the insects themselves. Cynthia Longfield's useful and handy volume in the Wayside and Woodland series and F. C. Fraser's part in the R.E.S. *Handbooks for the Identification of British Insects* are both out of print. In Yorkshire, and to some extent throughout the country, the dragonfly population has suffered loss of habitat due to deterioration and filling in of ponds and pollution of streams

and rivers. Around Leeds, for example, notable ponds such as those at Bramhope and Templenewsam, formerly the haunt of *Aeshna*, *Libellula*, *Sympetrum* and several damselflies, have been filled in. The two species of *Libellula* that formerly abounded on Skipwith Common have not been seen for many years. Colonies of *Agrion splendens* have vanished from the Wharfe at Harewood and Cattal while *Agrion virgo* has declined or vanished from the upper waters of the Derwent. *Lestes dryas* was obliterated by the East Coast floods of 1953 and has not been seen in Yorkshire since. On the other hand, to set against this catalogue of losses, there has been the discovery of several colonies of the damselfly *Erythromma najas* in East Yorkshire.

On to this scene comes Cyril Hammond's handsome book. Not, alas for field workers, a handy pocket-sized volume like that of Cynthia Longfield and lacking the dichotomous keys to species that make Fraser's work so quick to use when the dead specimen is in the hand, but splendidly illustrated with colour plates of the very highest quality. The sight of these beautifully coloured plates, as I write on this snowy winter day, brings a breath of summer and an urge to get out in the field with glasses and net and continue the search for the haunts of these magnificent insects. Although some will be deterred by the price, surely this book will inspire more to take up the study of the dragonflies.

The substance of the book is the coloured plates, each faced on the opposite page by a summary of the characteristic features of the species figured, with notes on flight, habitat and status accompanied by small 10 km. square distribution maps. Larger scale maps are appended and the participants in the national recording scheme can bring these up to date as he progresses. A. E. Gardner's key to the larvae, which originally appeared in the *Entomologist's Gazette*, is reprinted here in full.

The illustrations are intended to be used as the primary means of identification, determination being assisted and the distinctive characters confirmed by checking the notes. Only one error has been detected by the reviewer and that is the omission from the coloured plate of the black line at the base of the frons in *Sympetrum sanguineum*. A small point, but the shape of this line is critical in three other species of *Sympetrum* and its omission caused doubt in the mind of another entomologist who lacked experience in this Order and who was asked to check a teneral example of the species. It would have been helpful as a field guide to stress the smaller size of *Aeshna mixta* compared with others of the genus flying in the same area, a feature that usually attracts the watcher's attention in the late summer. But these are minor points. Here is a book that will enable any student to name reliably all the British dragonflies and Mr. Hammond is to be congratulated on his achievement in so splendidly filling a present gap in our literature.

J.H.F.

Flies by **Keith Snow.** Pp. 80. Priory Press. 1978. £3.50.

An attractive, but rather expensive, account of the diptera for the young naturalist. The excellent photograpy is spoilt by some poor captions and a mediocre text.

Imms' General Textbook of Entomology revised by **O. W. Richards** and **R. G. Davies.** 10th Edition, Chapman & Hall, London, 1977. Science Paperbacks Series. Vol. 1, Pp. 418, £5.95; Vol. 2, Pp. 933, £15.00.

In the fifty years or so since "A General Textbook of Entomology" first appeared, "Imms" as it is affectionately known, has become a classic by any standard. The last revision was in 1957 and during the intervening years considerable progress has been made in every branch of entomology. Another revision is, therefore, timely and although retaining the general format of earlier editions many portions have been re-written. In the process of incorporating present knowledge within the original layout the revisers have taken the opportunity to modernise the prose style of Dr. Imms where appropriate and the result is a very readable textbook. The extensive chapter references have been completely up-dated and will prove invaluable to the serious worker.

The production in two volumes is perhaps inevitable in view of the increased size of the book but one wonders how much hard wear the paper back edition will stand. The price will no doubt put off all but those who are obliged to purchase a copy for professional studies but the split into the two volumes has been sensibly arranged in that the first deals with Structure, Physiology and Development, whilst the second deals with Classification and Biology. It is the latter which will be of most interest to general entomologists, especially amateurs.

R.C.

Mountain, Field, and Family: The Economy and Human Ecology of an Andean Valley by **Stephen B. Brush.** Pp. xiv + 199 (including tables and line drawings), plus 10 plates. University of Pennsylvania Press. 1977. £10.40.

This scholarly account of the adaptation of a peasant society to the specialised environment of the Andes Mountains has been assembled mainly from data derived by the author and his wife through field observations made during an 11-month stay in the village of Uchucmarca. The book examines the relationship between the complexity of the mountain landscape (with its climatic and biotic components) and the adaptation of the indigenous human population. Sections are devoted to such topics as Andean geography, historical development of the community, agricultural resources and peasant economy. This volume contains a rich source of information of value to anthropologists, geographers, historical economists and environmentalists.

M.R.D.S.

The Chemical Environment, edited by **John Lenihan** and **William W. Fletcher.** Pp. x + 163, with numerous line drawings, tables and plates. Environment and Man, Vol. 6, Blackie. 1978. £8.90 cased, £4.50 limp.

This volume, the sixth in a series of authoritative works on important environmental issues, reviews the historical developments, harmful effects, control measures and likely outcome of further chemical pollution. A useful introduction on 'natural cycles of the elements and their perturbation by man' is followed by five chapters specifically devoted to the contaminants mercury, lead, arsenic, aflatoxins and asbestos.

Illustrated Guide to Barton Fossils compiled by **Tony Sanders and John Cooper.** Pp. 24 with 122 illustrations by Glenn Sanders and Paul Trippier. Privately printed. 1977. Available 75p post-free from T. Sanders, 340, Lymington Road, Highcliffe, Dorchester, or J. Cooper, 21, Yew Lane, New Milton, Hants.

Soon after interesting themselves in the fossils of the Barton Beds, the authors of this small Guide discovered the dearth of literature dealing specifically with the fossils of the region. They determined to fill in this lacuna. The resulting booklet is an act of homage on their part, to the area, to workers past and present, and to the pleasures their own involvement has brought. Open to criticism on several scores, their Guide disarms with its evident enthusiasm. It has that excitement about its subject which can at times seem sublimated out of existence in more rigorous work.

More attention to detail would have improved the finish of their product. Careful proof-reading of the index would not have overlooked, for instance, that *Volutocorbis scabricula* is shown on p. 12, not p. 13, nor that *Clavilithes* has eluded alphabetical order. Although, sensibly, use has been made of the fine illustrative work of, among others, A. G. Wrigley and J. De C. Sowerby, more might have been gleaned from the latter's excellent representational technique. Certainly the debt to his art demands more precise acknowledgement than an unsatisfactory reference on p. 24 to the work of Edwards and Wood, a reference to make any librarian despair. The illustrations, nevertheless, though uneven in quality, make an informing armchair trek through the delights of the Barton Beds.

A.H.

Plants with a Purpose. A Guide to the Everday Uses of Wild Plants by **Richard Mabey.** With 8 colour plates and 79 line drawings by **Marjorie Blamey.** Pp. 176. Collins, London, 1977. £4.50.

Richard Mabey's latest book is, in effect, a companion volume to his well known *Food for Free*, this time dealing with the practical, as distinct from the edible, uses to which wild plants may be put. These range from the sensible and down-to-earth to the frankly fantastic: the reader can learn the art of making a birch broom or walking stick, or if this seems too mundane, try his hand at something more exotic, say constructing a moss duster, extracting glue (a most effective one apparently) from bluebell bulbs, etching on fungus, or stuffing a mummy with lichen. I suspect that, as with his earlier book, more people will read this one for interest and pleasure than will actually put into practice the many possibilities suggested — mummies after all are somewhat hard to come by — but that is no reason for not buying this very attractive publication.

V.A.H.

Georgian and Regency Roses by **Peter Beales**, with colour photographs by **Keith Money.** Pp. 32. Jarrold, Norwich. 1977. 45p.

Early Victorian Roses by **Peter Beales**, with colour photographs by **Keith Money.** Pp. 32. Jarrold, Norwich. 1977. 45p.

These first-class booklets have only one fault; one wishes that they were at least twice as long. Written and illustrated by two devotees of old roses, text and photographs complement each other admirably: the photographs are among the best I have ever seen, and really do justice to the sumptuous beauties illustrated. Lovers of old roses should rush out and purchase both booklets as soon as the bookshop doors open! No doubt having read them and gloated over the pictures they will join me in my fervent wish to see the author and photographer collaborating on a larger-scale work on the subject.

V.A.H.

Hill Farm Story by **Ruth Janette Ruck.** Pp. 239, with 20 plates and numerous line illustrations. Faber and Faber. 1976. £2.25.

For a Nottingham girl townee to make the grade at thirty-two as a Welsh hill farmer who "could make a living where a rat would'nt" (a neighbour's accolade), took grit and application in plenty. This continuation of Ruth Janette Ruck's story shows the same down-to-earth optimism at work during the years following that transformation. Rescuing sheep or wool-gathering, mountaineering or recounting other aspects of Caernarvonshire life, her unsentimental narrative should cure any attack of "hiraeth".

A.H.

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The Y.N.U. Newsletter, sent to all Full members and Affiliated Societies, is published twice a year: May and September. Its aim is to provide a means of intercommunication between all members by giving, for example, reports on Y.N.U. and Society meetings and activities, items of broad Natural History interest, details of types of surveys and enquiries. All items should be sent to the Newsletter Editor: Mr. H. T. James, 238 Sigston Road, Beverley, Yorks.

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A REMARKABLE INLAND BRACKISH-WATER CRUSTACEAN FAUNA FROM THE LOWER AIRE VALLEY, YORKSHIRE: A CONUNDRUM FOR THE ECOLOGIST

GEOFFREY FRYER

Freshwater Biological Association, The Ferry House, Ambleside, Cumbria, LA22 0LP

Introduction

In recent years mining subsidence in the Lower Aire Valley has led to the development in the Mickletown area of a series of lagoons or flashes, the history of whose formation has been documented in some detail (Brook 1976). Of the seven lagoons now present (Fig. 1), the westernmost, Mickletown Flash, is the oldest. Evidence adduced by Brook indicates that for several centuries this was a marshy area and that open water appeared shortly before 1890. None of the other water bodies existed in 1948 though marshy areas heralded their subsequent development, and by 1973 their arrangement was not very different from that of 1977 (see maps in Brook, 1976) save that the New Flash did not form until 1976/77. To the west of Mickletown Flash colliery waste has been dumped since at least 1905 but, though this obliterated a water body to the north of it, it did not seriously encroach on the existing flash until the 1970s. By 1977 the flash was reduced to half the area it occupied a few years earlier and its western shore consisted of colliery spoil. Presumably because of mineral salts leaching from this almost vegetationless mound the waters of Mickletown Flash are of a brackish nature and the same is evidently true of the surrounding soil.

A chemical survey of all the water bodies involved shows that the "saltiest" water is found in Mickletown Flash but that all have an unusually high ionic content, the salinity diminishing from west to east (Fig. 1). (Figures for the two westernmost water bodies are averages of two very similar analyses, the rest are single analyses.) This can be most easily appreciated by reference to the figures for electrical conductivity. Even the waters of Boat Lane Ing, the least saline of the lagoons, have a level of both total ions and of sodium that is more than twice as high as in the adjacent River Aire, which itself has a relatively high ionic content, doubtless reflecting the input of effluents upstream and perhaps seepage from nearby slag heaps as well as the terrain over which it flows. Although for convenience the water can be termed brackish, its chemical composition is different from that of coastal brackish water, there being for example much more calcium and magnesium in relation to sodium than in sea water. To render the figures more meaningful analyses for sea water and for Windermere, a soft-water lake with a low salt content, are also given in Fig. 1.

The Brackish-water Crustacean Fauna

A particularly interesting consequence of the high salt content is that the area has been colonised by a number of brackish water plants and insects (Brook, 1976; and see below). Recent collections have now revealed the presence in the area of a remarkable assemblage of crustaceans that are generally confined to brackish waters and whose presence presents intriguing problems to the ecologist.

The largest and most conspicuous of the crustaceans found at Mickletown is the amphipod *Gammarus duebeni* Liljeborg (Fig. 2a), a species whose distribution has evinced considerable interest in recent years. Long known as a brackish-water species widely distributed around our coasts and many of those of Europe, it became the object of several studies when it was found to occur in freshwater in Ireland, in which (and in Brittany) it is now known to be widely distributed and where it appears to fill a similar niche to that occupied by *G. pulex* (L.) in Britain. Careful search has now revealed its presence in freshwater in certain areas of the extreme western fringe of Britain, but not elsewhere in such waters on the mainland. Both these freshwater popuations and populations from brackish-water have been the subject of several ecological and physiological studies and of interesting hypotheses concerning the historical sequence which led to the present pattern of distri-

bution (Hynes, 1954; Sutcliffe, 1967; and see below). The finds at Mickletown have some bearing on these matters.

Although it was Reid's (1939) revelation of the widespread nature of this species in freshwater in Ireland that sparked off the recent work on the animal this was not, as is generally supposed, the first report of *G. duebeni* from freshwater, nor even the first time it had been recorded from such waters in Ireland. That earlier observations should have been overlooked is all the more curious in view of the fact that Reid himself refers to some of them. It was first found in freshwater in mainland Britain in the Kintyre Peninsula, Scotland, by Scott (1897) whose record has subsequently been overlooked. When recording it from Loch Ruan, which "is situated several hundred feet above sea level" he specifically remarked that although this amphipod is to be found in brackish water, his discovery indicated that it is "not limited to such conditions". With Duthie (Scott and Duthie, 1895) he had indeed earlier recorded it with some reservations from five freshwater lochs in the Shetland Islands. These reservations had gone when, both alone (Scott, 1896) and with Duthie (Scott and Duthie, 1897), he recorded it from several additional such lochs in Shetland. Its independent rediscovery in freshwater in Shetland by Stephensen (1928) and in Kintyre by Sutcliffe (1967) bears testimony to Scott's taxonomic and ecological skill, now belatedly brought to notice. Earlier records from freshwater in Ireland also exist, namely those of Walker (1898) who found it in Loughs Doon and Corrib, Kane (1907) who reported it, mis-spelled, from Loughs Erne and Mask, and Tattersall (1913) who found it on Clare Island. Incidentally, none of these workers, whose records have also been generally overlooked, expressed surprise at finding it in freshwater.

It has been accepted by all recent writers that no inland brackish-water populations of *G. duebeni* had been recorded until those mentioned by Holland (1976) cited below, unless one considers a Norwegian population found by Økland (1959) in a brackish ditch whose nearest point lay only 1.7 km from the sea to constitute such. All have strangely overlooked the reports by Gurney (1904, 1907, 1929) of the presence of this species in Hickling Broad and Horsey Mere, Norfolk, beneath which the water-table is saline and which are perhaps fed by saline springs. Although both these meres lie less than 5 km from the sea their connection with it is via the Rivers Thurne and Bure, a distance of almost 30 km, and Gurney (1907) believed that *G. duebeni* did not ordinarily occur in the river much below the meres. He also reported it in the Muckfleet, a dike connecting with the R. Bure about 12 km upstream, where salinities fluctuate.

Holland (1976) has now found *G. duebeni* in brackish water in the Mersey and Weaver drainage area of Lancashire and Cheshire where waters of high salt content reflect the influence of the Cheshire salt field. Its presence, and that of two other brackish-water amphipods is, he suggests, at variance with Hynes' (1970) view that brackish-water coastal organisms never seem to invade inland saline waters even when these lie in close proximity to the coast. As in fact the local canal systems provide an unbroken continuum of saline habitats between the coast and the most inland sites frequented by *G. duebeni* (about 30 km from the coast) this claim is difficult to substantiate.

The presence of *G. duebeni* at Mickletown constitutes a more striking exception to Hynes's generalisation than do even the Norfolk populations whose original colonisation, aided by tidal influxes, is not diffiult to explain. Here it has been found in the four westernmost, most saline, lagoons, that is Mickletown Flash, Cutler Lane Ing and the two unnamed lagoons between them, all of which are interconnected. It has also been found in the channel that links Cutler Lane Ing to its western neighbour. Its abundance varies according to the nature of the habitats provided within these water bodies. Thus while it was abundant in beds of *Callitriche* in the small lagoon adjacent to Mickletown Flash careful search was necessary before even a single specimen was located in the latter lagoon, many parts of which have a very foul bottom. It has not been found in the two eastern lagoons — The Whinny and Boat Lane Ing — although these were searched with a suitable net after its presence in other lagoons, with which they are linked by drains, had been established. It is tempting to attribute the absence of *G. duebeni* to the lower salt content of these lagoons but the nature of the habitat may be involved and the dense masses of *Typha* on much of the shore-line makes it

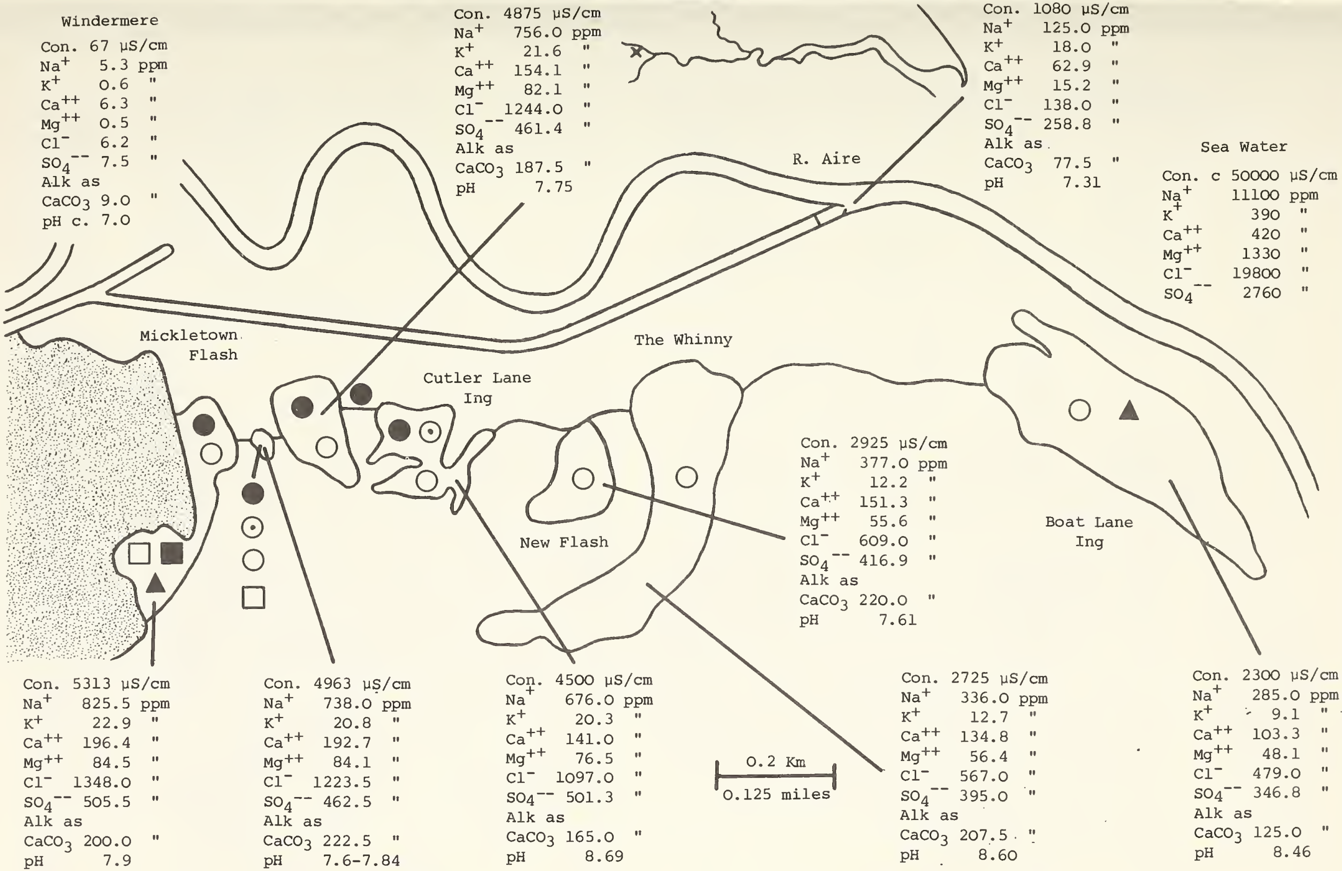

Figure 1. The lagoons at Mickletown Ings. Analyses for Windermere and for sea water are given for comparison. Conductivities are at 25°C. The sulphate values include nitrates whose contribution is, however, probably insignificant. For symbols see Fig. 2.

difficult to collect with a net so the animal may yet be found there. It is perhaps significant, however, that another amphipod, the smaller, truly freshwater, *Crangonyx pseudogracilis* Bousfield was found at Boat Lane Ing and nowhere else. This is a North American species, first found in Britain in 1937, which has subsequently spread rapidly. It was first reported in Yorkshire in 1951 (Fryer, 1952) and I have subsequently found it elsewhere in the county. No amphipods were found in the recently formed New Flash but this has not been adequately searched.

So far as I am aware there is no published information on the coastal distribution of *G. duebeni* in the vicinity of the Humber, the nearest coastal or estuarine region to Mickletown, but I have found it both at Faxfleet on the north side and at Blacktoft Sands on the south so brackish-water populations certainly exist in the area from which colonisation would appear to have been easiest in terms of distance.

Before discussing the problems raised by *G. duebeni* the other brackish-water crustaceans of Mickletown call for attention. These include two ostracods, *Cypridopsis aculeata* (O. G. Costa) and *Heterocypris salina* (Brady). *C. aculeata* (Fig. 2e), a distinctive and easily recognisable species, adults of which are usually less than 0.75 mm in length, is widely distributed in brackish-waters around the coasts of Europe and further afield, is also recorded from saline waters in Central Asia and, very rarely, from freshwater. Its physiology with respect to osmoregulation is unknown but its occurrence in inland waters in Europe is peculiar. For example Klie (1938), who reports it as widely distributed in brackish-water on the German coast, gives three inland records from freshwater in that country but says that it has not been found in any inland saline water in Germany. In Britain, Scourfield (1904) summarised its ecology by saying "Not found as a rule very far away from slightly brackish water" to which there is little to add today. It occurs, or occurred, for example in the Norfolk Broads where such influences are felt. In Yorkshire I have found it near the coast at Kilnsea and Adlingfleet very near brackish or salty water and also rather further inland in the East Riding under conditions suspected as being "fresh" but for which no chemical data were obtained. Its distribution at Mickletown so far as it has yet been ascertained is shown in Fig. 1. The indications are that it will prove to be distributed throughout the inter-connected water bodies.

The equally distinctive *Heterocypris salina* (Fig. 2f), which attains a length of about 1.2 mm, is, like *C. aculeata*, widely distributed in brackish water around the coasts of Europe and beyond. It is also recorded from a number of inland saline waters in Europe and, in rare instances, apparently from freshwater. The physiological aspects of its ecology are little known but it is clearly a very tolerant species salinity-wise and with respect to temperature but seems only very exceptionally to frequent the more usual type of "fresh" water. In Britain it is found, according to Scourfield (1904) only "in situations where the water can be at least occasionally brackish". The only coastal locality in which I have collected it in Yorkshire (whose brackish waters I have scarcely investigated) is a lagoon at Faxfleet where it occurs with other brackish and with several salt-tolerant freshwater crustaceans. I have, however, found it in two inland localities in N.E. Yorkshire in water of peculiar chemical composition and high conductivity. At Mickletown it has so far been found only in Mickletown Flash, the most saline of the ensemble of lagoons.

There is an interesting precedent for the occurrence of *C. aculeata* and *H. salina* in water that owes its peculiar chemistry to mine workings. As long ago as 1866, Brady reported both from a colliery pond at Monkwearmouth — which is of course also in close proximity to the sea — where the water was "so impregnated with earthy salts as to deposit a thick coating of carbonate of lime on the leaves of the plants" living there and where, incidentally, the water "often reaches a temperature of 100°F" (*c.* 38°C). Klie (1938) also reports *H. salina* from water at 34°C. The peculiar chemistry of one of the inland localities in N.E. Yorkshire also probably owed something to mining, but in this case for iron.

Of the copepods found at Mickletown three merit consideration. Much the most exciting from the point of view of the brackish-water facies of the fauna is *Thersitina gasterostei* Pagenstecher (Fig. 2d) which is a parasite of the Sticklebacks, *Gasterosteus aculeatus* L. and *Pungitius pungitius* (L.), fishes whose tolerance of brackish water is well known. This is a

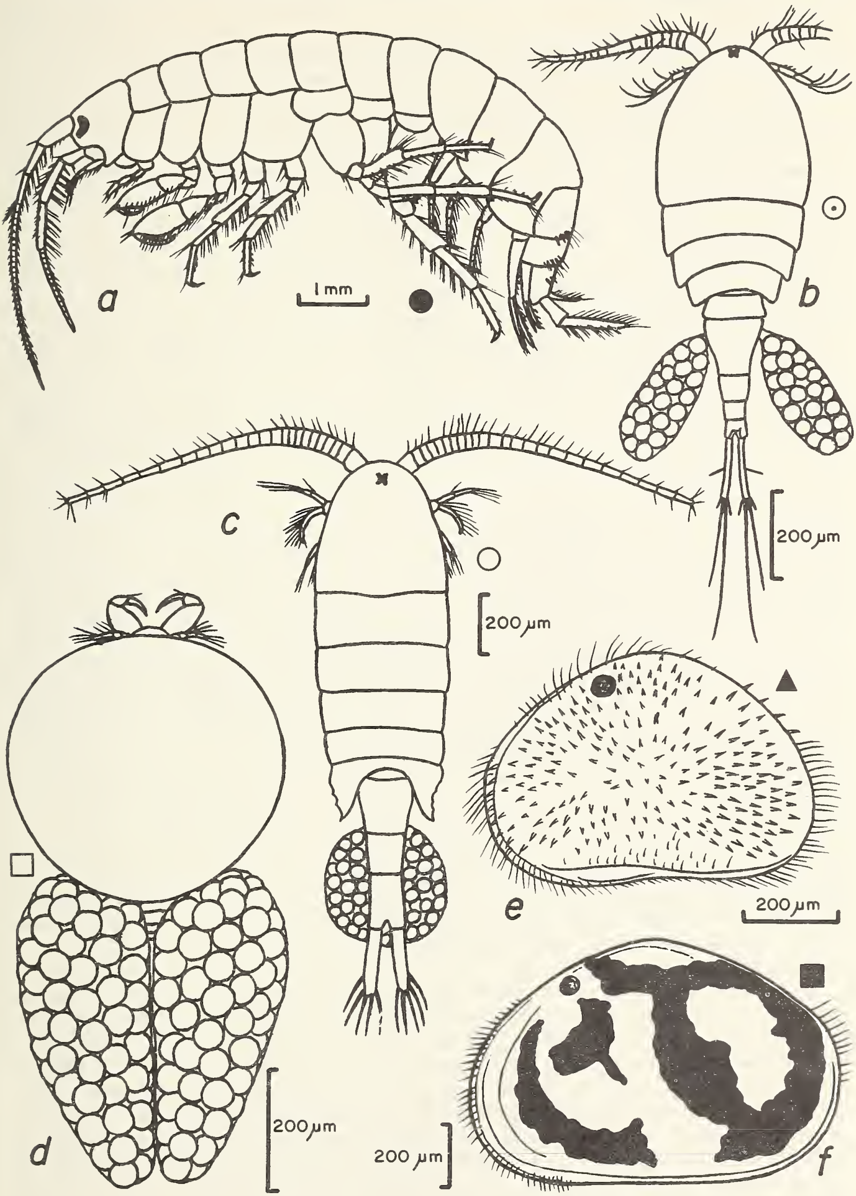

Figure 2. The brackish-water and euryhaline crustaceans of Mickletown Ings. a. *Gammarus duebeni*. b. *Acanthocyclops bicuspidatus lubbocki*. c. *Eurytemora velox*. d. *Thersitina gasterostei*. e. *Cypridopsis aculeata*. f. *Heterocypris salina*.

species which is known from several, but not many, brackish coastal waters in Britain and also from similar situations in Europe as well as in N. America, Greenland and the Faroes. So far as I know it has not been seen in brackish water near the Yorkshire coast but this may merely reflect lack of search. It has, however, unexpectedly, already been found inland in Yorkshire, at Wintersett about 13 km almost due south of Mickletown. Here it was recognised by Dr. G. A. Boxshall, and has since been studied by Dr. K. Sadler whose as yet unpublished observations are included in a thesis of Leeds University. It was in fact my chance knowledge of this find that caused me to look for *Thersitina* at Mickletown after finding other brackish-water crustaceans, and I am most grateful to Drs. Boxshall and Sadler for permission to mention their find here. At Wintersett, as at Mickletown, it frequents alkaline water (pH 8.4) of high ionic content — conductivity 2000 μS cm^{-1}, Na^+ 290, Ca^{++} 118, Mg^{++} 75, Cl^- 264, SO_4^{--} 92 mg/l (= ppm) (K. Sadler). Although at Mickletown it has been seen only in Mickletown Flash and the adjacent lagoon it probably occurs in whichever lagoons have been colonised by its hosts.

A free-living cyclopoid found at Mickletown is also indicative of the "saline" nature of the water but the evidence it provides is somewhat equivocal. *Acanthocyclops bicuspidatus* (Claus) is a common freshwater species, usually found in small bodies of water, and for which I have records for about 50 localities in Yorkshire, mostly in lower-lying areas. There appear to be no published British records of this species from brackish water though I have found it inland in N.E. Yorkshire in water of high ionic content (conductivity 3821 μS cm^{-1} at 25°C) and it is known from brackish water in continental Europe (see Dussart, 1969). The animal known as *A. b. lubbocki* (Fig. 2b), which is the form found at Mickletown, differs from *A. b. bicuspidatus* chiefly in having only 14 antennular segments instead of the 17, probably representing the primitive number, found in *A. bicuspidatus.* It also occurs particularly in brackish water, and I have seen it in such situations in Yorkshire. In most cases therefore the number of segments of the antennule is related to the salt content of the water but whether the difference is genetic or environmentally induced is not known. Furthermore the *lubbocki* form (and "form" is probably a better designation than sub-species in this instance) is occasionally found in freshwater and has been so found in Britain (Gurney, 1933). While on its own therefore this record would be of no great significance, the fact that it is the *lubbocki* form that occurs at Mickletown in the company of acknowledged brackish-water crustaceans is in keeping with the general facies of the fauna.

A third copepod that merits mention in this connection is the calanoid *Eurytemora velox* (Liljeborg) (Fig. 2c) which frequents open water in all seven of the lagoons. This is a euryhaline species found in brackish coastal pools and in freshwater inland. I have a few inland records from freshwater in Yorkshire — all artificial waters for the colonisation of which it seems to be particularly adapted (Gurney, 1933) — but it is very much less common in the county than *Eudiaptomus gracilis* (G. O. Sars) which occupies a similar niche. Again in isolation the records would be of no great significance, but the fact that it is *E. velox* and not *E. gracilis* that is found throughout the Mickletown system is in keeping with the general nature of the fauna.

The rest of the crustacean fauna consists for the most part of common freshwater species that tolerate a relatively high ionic content of the water, plus a few less common forms. The great tolerance of some common freshwater species — the cladoceran *Chydorus sphaericus* (O. F. Müller) and the copepods *Eucyclops agilis* (Koch) and *Acanthocyclops viridis* (Jurine) — is shown by their occurrence in all seven lagoons and, in the case of the copepods, also in the adjacent river. Several species have so far been found only in the more eastern, least saline, lagoons, there being a tendency for faunal diversity to increase from west to east. This is not in perfect harmony with the decrease in salinity, partly because the New Flash in particular has been inadequately searched, and may indeed not yet have had time to acquire its full complement of species. Certainly, however, the Whinny (23 species so far recorded) and Boat Lane Ing (20) have the richest faunas, which include a few species found only in one or both of these lagoons or in them and their two nearest neighbours.

THE PROBLEM OF COLONISATION AND THE HISTORY OF *GAMMARUS* IN FRESHWATER IN THE BRITISH ISLES

The presence of a remarkable brackish-water assemblage of crustaceans at Mickletown poses the problem of how its members colonised the area. There is no direct brackish-water link with the coast. The theoretical tidal reach of the R. Aire is to Chapel Haddlesey, some 29 km downstream of Mickletown allowing for meanders, but in practice the tide apparently never reaches so far upstream though water builds up as far as this. Further, the lagoons are of recent origin. Of the seven only Mickletown Flash, which lies on an old river terrace above the floodplain, existed in 1948, the rest, of which only part of Boat Lane Ing lies in the floodplain, were formed by subsidence subsequent to the building of flood banks along the river. Except in the case of the parasitic *Thersitina*, whose hosts may well have reached the area via the river and drains, colonisation via the river, even if it had been a physical and physiological possibility, can therefore almost certainly be ruled out. This probably applies even to the amphipod *G. duebeni* though, according to the observations of Sutcliffe (1967), the level of sodium and chlorides in the river is sufficiently high to permit survival of the form normally living in brackish water. The minute free-living forms could certainly not have arrived via the river. The time of highest levels is that at which physical conditions are most opposed to upstream movement. It should also be remembered that the Aire has suffered considerably from pollution in the recent past.

The most interesting animal from the point of view of colonisation is probably *G. duebeni*. Unlike some small freshwater crustaceans it does not have a drought-resistant resting stage, and as the eggs are carried by the female dispersal can only be by means of the animal itself. *G. duebeni* can crawl when out of water by "standing up" and using its abdomen and uropods as a lever but can scarcely be expected to move far by such means. Segerstrale (1946) showed that under certain conditions individuals can survive for several hours out of water and I have noticed that the epimeral plates and appendages serve to retain a reservoir of water ventrally and that even when this has disappeared individuals can remain active for some time. Overland dispersal therefore seems feasible and the most obvious agents are birds. Segerstrale (1946) has indeed already suggested that *G. duebeni* may be carried from one pool to another by birds and the possibility that it found its way to Mickletown by such means is enhanced by the fact that the Aire Valley is an important migration route for waders and water-fowl. One gravid female or a few introductions of individuals of both sexes — and very small animals may the more easily find a refuge among feathers or on a webbed foot — may have been sufficient to seed the site.

As the lagoons are of such recent origin it is perhaps fair to infer that the dispersal abilities of *G. duebeni* are greater than previously appreciated. This is particularly interesting in view of Sutcliffe's (1967) observations. In the extreme west of Britain he suspects, with chemical data to support his suspicions, that it is restricted to peninsulas and headlands which are exposed to the full force of south-westerly gales which locally raise the salt content of the water. In such areas, however, he finds it to occur in quite restricted areas in streams in close proximity to one another and not throughout the areas of high salt content. This may indicate problems of dispersal or, as Sutcliffe suggests, that *G. duebeni* may be in the process of colonising freshwater in Britain (but see below).

The occurrence of *G. duebeni* at Mickletown is relevant to the history of this and other species of *Gammarus* in freshwater in Britain. Hynes (1954) believed that, following the retreat of the Pleistocene ice sheet, *G. duebeni* colonised, and became widespread in, the freshwaters of the British Isles but is now being ousted by a later wave of colonising *G. pulex* which has replaced it except in a few remote places in the extreme west, and in Ireland which *G. pulex* failed to reach before the Irish Sea broke through and granted isolation. On the basis of work on the distribution and ecology of *G. duebeni* and *G. pulex* in Brittany, Pinkster, Dennert, *et al* (1970) supported Hynes' view that the former is being replaced by the latter as the outcome of competition. They also expressed the view that the freshwater form of *G. duebeni* (regarded by them as a subspecies *G. d. celticus*) became physiologically adapted as such from a brackish-water ancestor *(G. d. duebeni)* during an interglacial period. Later Dennert (1974) performed experiments the results of which he interpreted as

supporting the idea that *G. pulex* is capable of ousting the freshwater *G. duebeni.* Sutcliffe (1967) on the other hand was unable to support the view that *G. duebeni* was formerly widespread in freshwater in Britain as his physiological studies clearly showed that, while the Irish populations are adapted to life in freshwater, the mainland British forms are not. Perhaps his most remarkable discovery (Sutcliffe, 1971) was that the mainland form could acquire, probably phenotypically (though rapid selection cannot be ruled out) the physiological attributes of the Irish form in one or two generations; which immediately raises the question of why, in nature, it did not apparently do so as this would favour its expansion into waters of low ionic content. More recently Dennert (1975) has worked with certain western Scottish populations of *G. duebeni* and, on the basis of rather scanty data, feels that the evidence here does not support the competitive expulsion of *G. duebeni* by *G. pulex* but suggests that *G. duebeni* is a recent invader of freshwater.

Any hypothesis has also to take into account a third amphipod *G. lacustris* G. O. Sars, whose history in Britain also presents problems. This is basically a Boreo-Alpine, lacustrine species that tolerates low temperatures and is apparently absent from the central European lowlands because of the relatively high temperatures encountered there. In Britain it has a predominantly northern and western distribution, is widespread in Scotland, especially in the north and west, and in Ireland, and is known from a few lakes in northern England and Wales. In Yorkshire it is known only from Malham Tarn where it co-exists with *G. pulex* (Fryer, 1953a). Sutcliffe (1972), who discovered *G. lacustris* in several lakes in Northumberland, has referred to problems concerning its dispersal and noted the difficulty of inferring past history from present distribution. Perhaps wisely he does not commit himself to any particular theory regarding the past history of this species in Britain.

According to Segerstrale (1954) the northern Scandinavian and British populations of *G. lacustris* are derived from animals that survived in unglaciated areas during the last glaciation, a hypothesis that is favoured by its occurrence in the Faroes and by other evidence from Scandinavia which need not, however, necessarily apply to the populations in the British Isles. Hynes (1956) tentatively accepts the glacial refuge theory and mentions two possible sites — off western Ireland and near the Hebrides. While accepting that its general distribution is that of a northern form of the former ice-field margins Thienemann (1950) had, however, already pointed out that its occurrence in Alpine regions did not accord with such a history. Furthermore populations in southern Sweden were evidently derived from invaders from central Europe and those in the British Isles may have had a similar origin.

The following sequence of events, which goes some way towards reconciling the views of Hynes and Sutcliffe, is now tentatively suggested. As the ice retreated *G. duebeni* would occur in brackish-water around Britain and Ireland. *G. lacustris* either arrived early from Europe — being a cold-loving species it would tend to follow the retreating ice and would encounter lacustrine conditions at its margin — and colonised Britain and Ireland or, as Segerstrale believes, colonised from inter-glacial refuges. If these refuges were in southern Ireland, Scotland could have been colonised from there as the ice retreated northward, and northern England and Wales populated by individuals subsequently advancing southward while the climate was still cool. There seems no need to envisage a second refuge near the Hebrides as did Hynes. As the climate ameliorated *G. pulex* crossed the existing land bridge and colonised freshwaters in Britain but was unable to reach Ireland before the Irish Sea broke through — an event which took place relatively early in post-glacial times. Possibly for climatic reasons (see below) *G. duebeni* did not at first begin to penetrate freshwater in the tundra-like conditions then prevailing. *G. pulex* gradually established itself in Britain while, if an earlier invader from the Continent, *G. lacustris* retreated north for either climatic or ecological reasons, including possible competition with *G. pulex*, or for a combination of such reasons. If it came from glacial refuges it may never have extended very far south in Britain. As the climate improved *G. duebeni* penetrated freshwater in Ireland (and Brittany) where, in the former, the presence of *G. lacustris* was evidently not a serious obstacle, but attempts to do so in Britain were prevented by *G. pulex* except where, because of slightly increased salinity (western headlands) *G. duebeni* was at an advantage. That dispersal to suitable waters is not likely to have been a problem is indicated by the situation at

Mickletown and in the Hickling Broad, Horsey Mere and Muckfleet areas. This postulated late invasion seems to present fewer problems than does the idea of Pinkster *et al.* (1970) that the freshwater *(celticus)* form of *G. duebeni* evolved during an interglacial period. Unlike them I believe that the short time span involved would be amply sufficient to permit the acquisition of the (largely physiological) attributes that distinguish the brackish *(duebeni)* and freshwater *(celticus)* races or subspecies. Striking changes have taken place in much shorter periods of time in some animals e.g. the development of insecticide resistance in certain insects, and one has to look no further than the remarkable changes that occurred in Sutcliffe's Kintyre population of *G. duebeni* — which Stock and Pinkster (1970) are willing to consider as genotypic. The slight morphological differences between Irish and Breton populations of the *celticus* form demonstrated by Pinkster *et al.* do no violence to this belief.

The reason why the British populations of *G. duebeni* have not developed the physiological attributes of those in Ireland — which they are capable of doing — may be simply because they have no need to do so in the habitats they frequent, i.e. in water of above average salinity. Any populations that did acquire such, and it is difficult to believe that they did not so easily is this accomplished, were perhaps eliminated by *G. pulex* and are therefore not to be found in nature.

The problem remains as to why the freshwaters of Scandinavia (and northern Scotland) have not been colonised by *G. duebeni*. Hynes (1954) suggests that the more severe winters in Scandinavia than in most of Britain may be the factor involved and it might be noted that marine/brackish crustaceans in general have been more successful at penetrating freshwater in warm than in cold climates. The physiological effort demanded may be too great in Scandinavia.

It seems unnecessary to postulate that *G. duebeni* is in the process of colonising freshwater in Britain as tentatively suggested by Sutcliffe (1967). The populations now established could equally well be of considerable antiquity. That this species has not colonised apparently suitable streams in areas where it is established may, as Sutcliffe himself points out, be due to any of several factors. Similar "unaccountable" absences hold good equally for *G. pulex*. An area where neither species apparently occurs, but where *G. lacustris* is established in suitable habitats, is the extreme north of Scotland where a rigorous climate may be involved. Of all British coasts that of northern Scotland is the one with the lowest mean annual accumulated temperature over 6°C. Had the freshwater form of *G. duebeni* evolved in an interglacial period one might have expected it to be adapted to cool conditions and to have been able to occupy northern Scotland, and perhaps even to have reached western Scandinavia where its putative competitor *G. pulex* is again absent.

There remains the question of how the smaller brackish-water crustaceans colonised Mickletown. Whether either of the two ostracods involved can produce drought-resistant resting eggs, as can some of their freshwater relatives, seems not to be known. The occasional occurrences in freshwater of *Cypridopsis aculeata* are, according to Klie (1938), in situations that do not dry out, which perhaps indicates an inability to produce such eggs, but more information is needed. In the case of both species transport of live individuals by birds seems the most likely means of dispersal. In material preserved in the field I have seen specimens of another ostracod, *Cyclocypris ovum* (Jurine) attached to the remnants of a bird's feather, and large numbers of the same species firmly attached to a fragment of frayed rope of similar texture, which suggests that in adversity they firmly clamp their valves over the object to which they happen to be attached.

C. aculeata at least is also small enough to be transported by insects. I have myself seen ostracods — *Cyclocypris laevis* (O. F. Müller) — attached to *Notonecta* (Fryer, 1953) and the possibility of a brief, perhaps wind-assisted, flight while so attached is not to be ruled out. As in both *C. aculeata* and *Heterocypris salina* only parthenogenetic females are known only one individual would be needed to seed the site. By whatever means *H. salina* is dispersed, efficiency is indicated by its occurrence in the Azores, and by the way it has located two small but suitable inland areas in North Yorkshire.

Both the free-living copepods involved possess drought-resistant resting stages on which considerable light has been thrown by Champeau (1970). *Acanthocyclops bicuspidatus*

lubbocki can withstand desiccation and become dormant in either of the last two copepodid stages or as an adult, though it is the penultimate copepodid stage that is usually involved, while *Eurytemora velox* can produce eggs that have similar properties. It is easy to see how such stages can be transported by migrating birds, to whose feet, beaks or feathers only minute quantities of mud need become attached in order to carry them. It is possible that resting eggs can also pass unharmed through the gut of a bird and be carried while on passage.

The parasitic copepod *Thersitina gasterostei* has clearly been dispersed by its hosts. The three-spined stickleback *(Gasterosteus aculeatus)* is, throughout most of its very extensive range, a coastal, brackish-water fish and only in certain parts of western Europe does it penetrate freshwater. The ten-spined stickleback *(Pugnitius pugnitius)*, which also serves as a host at Mickletown, is likewise euryhaline. Gurney (1913) who found *Thersitina* abundantly in "somewhat brackish-water" near Yarmouth, Norfolk never found it "in quite fresh water" and Walkey *et al.* (1970) who found it in several parts of the Norfolk Broads region never saw it where the conductivity of the water was lower than about $800 \mu S\,cm^{-1}$. (They use the older notation of μmho and, curiously, refer to cm^3 when a linear distance is in fact involved, and do not specify the temperature — which is important as conductivity varies with temperature.) However, within the range at which it must have been measured, the figure is sufficiently accurate, irrespective of temperature, to indicate that the parasite could probably survive in the lower parts of the Aire — pollution permitting — which would facilitate its inland penetration. For how long conductivities of such a level have existed in the Aire is, however, unknown. It would be inappropriate to consider here how *Thersitina* got to Wintersett, but its hosts probably utilised the complex system of canals that either now or formerly linked the Aire/Calder and Dearne/Don systems.

The crustaceans add a substantial element to the brackish-water flora and fauna already reported from the Mickletown area. The plants include the alien Buttonweed, *Cotula coronopifolia* L., the sedge *Schoenoplectus tabernaemontani* (Gmel.) and the rush *Juncus gerardii* Lois, the animals the rare and wholly aquatic chrysomelid beetle *Macroplea mutica* Fabricus and two predominantly coastal or estuarine flies, the dolichopodid *Rhaphium antennatum* Carlier (syn. *Porphyrops antennata*) and the muscid *Spilogona biseriata* (Stein), all three of which are otherwise known in Yorkshire only from the vicinity of Spurn (Brook, 1976). With the possible exception of *Macroplea*, which may be unable to fly, these organisms are probably better equipped for dispersal than some of the crustaceans involved. Plant seeds can be dispersed in several ways and wind-assisted flight can be used by winged insects. Nevertheless the total brackish element at Mickletown constitutes a remarkable assemblage. The way in which such animals have located and colonised this small, recently-formed, isolated, but favourable, habitat in a manner analogous to the colonisation of an island poses interesting ecological problems and, if nothing else, reveals the paucity of our knowledge of the precise means whereby certain aquatic invertebrates are dispersed. The site can truly be termed unique in Britain and it is tragic that it should be threatened by open-cast coaling operations that would not only destroy it but cause great hardship to those living in the vicinity. It is hoped that if the coal must be got some less destructive means of removing it can be devised.

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BOOK REVIEW

An Atlas of the Wild Flowers of Britain and Northern Europe by **Alistair Fitter.** Pp. 272, including many coloured maps. Collins. 1978. £5.95.

This book is a companion volume to *The Wild Flowers of Britain and Northern Europe*, and provides distributional maps for 1972 species within an area comprising the British Isles, Iceland, Sweden, Denmark, Holland, Belgium, Luxembourg and Germany, most of Norway, France, Poland, Austria and Czechoslovakia, and parts of Switzerland and Finland. However, it should be noted that the distribution data for the Alps are less reliable than for other areas, since this region is strictly outside the scope of the book but has been included for cartographic convenience; in fact this may be said for other areas, for the book deals essentially with north-western rather than northern Europe. An extension of coverage to include southern France, Spain and the rest of the Alps would of corse have provided a more useful manual for sun-loving migrants.

Each map is colour-coded to show the distribution of (1) native plants and established introductions, (2) recently introduced species, and (3) casual occurrences.

A five-point scale of the four habitat preferences (wetness, acidity, fertility and shade) accompanies each map. A useful introduction with maps of January and July mean temperatures, annual and July rainfall, annual excess of rainfall over evaporation, soil types, distribution of bogs and fens, major land use, and potential vegetation is also provided.

This work represents outstanding value, and the author and publishers are to be commended for their excellent presentation of such a wealth of material.

M.R.D.S.

THE OLD DUCK DECOYS OF SOUTH-EAST YORKSHIRE

MARTIN LIMBERT

INTRODUCTION

During recent research into old bird records from Thorne Moors, it became quite clear that Nelson (1907), in his review of Yorkshire ducks decoys, had set down misleading and inadequate information about the decoys of the Thorne-Goole area. At about the same time, it also became clear to me that the decoys of the Doncaster area had hitherto been inadequately documented; Doncaster Decoy has been studied to some degree in Mitchell *et al* (1971), but this source is not easily obtainable. This paper is therefore an attempt to set down whatever details are known about the duck decoys of south-east Yorkshire. It does not, however, pretent to be comprehensive, being rather a basis upon which further research may be built.

A HISTORY OF DECOYING

By the reign of John (A.D. 1199–1266) moulting ducks and "flappers" were being captured in England by being driven into the corner of a mere or pond which was equipped with nets to guide the birds into tunnel-like nets called pipes, with a trap at one end. The existence of such traps and a knowledge of how they worked made the assimilation of more sophisticated Dutch ideas far easier when the latter appeared in the seventeenth century. Rather than driving flightless ducks into a trap, the new Dutch method was essentially the *enticing* of full-winged ducks. This latter method was introduced by the Dutch who came here to supervise and effect drainage schemes, though there were other Dutch connections too, for as smugglers, fishermen and merchants, Dutchmen were well known on the south-eastern coasts of England. One thing is certain; decoys on a significant scale would not have been effective until the Dutch had eliminated, at least to some degree, the extensive areas of winter flooding in eastern England, since flood waters provided too large a feeding area for decoys to be effective. Borough Fen Decoy in Northamptonshire was probably constructed between 1630 and 1640, Doncaster Decoy on Potteric Carr was certainly complete in 1661, and in 1665 the decoy in St. James Park, London, was nearing completion.

Payne-Gallwey (1886), explaining the significance of the new Dutch method, wrote: "Instead of driving the fowl with a mob of assistants into a net at the end of a large lake, they now preserved the ducks on a small pool, from which one man could lure them into a pipe or pipes attached to it, and take all the profit to himself, in a quiet and methodical manner."

In subsequent years decoys flourished, and at their peak between 1750 and 1850, perhaps 250 were in existence in England, Wales and Ireland, though this total was much reduced by the late nineteenth century. In 1886, 47 were still operating (44 in England and Wales, 3 in Ireland) though by 1918 there were only 28 still extant in England and Wales. The Lincolnshire decoys were the most famous, though significant numbers existed in Essex, Suffolk, Norfolk and Yorkshire. Those that survived the longest were often the ones run by wealthy gentlemen for pleasure rather than profit.

Several factors brought about the demise of the decoys. Most far-reaching were the effects of increasing land drainage and reclamation, but there were other factors. The introduction of the breech loading gun had an effect since it caused greater disturbance, and decoys came to be considered unsporting. Economics eventually went against the decoys too since the prices of ducks on the market no longer covered the expense of keeping a decoyman, and the cost of the upkeep of the decoy and its surrounding wood gradually rose as well.

After Payne-Gallwey's book, the decoys continued to decline, though the trend was partially reversed when food prices rose during the First World War. This was only temporary however and one decoy after another was subsequently abandoned and fell into disrepair. One or two persisted; the last commercial decoy, at Nacton in Suffolk, ceased

operating for profit about 1968, and it subsequently became a ringing site (the fate of the handful of other decoys still intact). Commercial decoys remain in the Netherlands, though the kills are offset to some degree by use of the decoys as breeding reserves in the summer.

The Duck Decoys Of South-East Yorkshire

The lowland marshes of England, which were so ideal for the operation of decoys, extended north into Yorkshire. The most famous Yorkshire decoys were those of Holderness, as at Meaux, Scorborough and Holme. The remaining Yorkshire decoys included several around Doncaster and Goole in the marshes of the Humberhead Levels or close by, and it is these which are detailed in this section.

Not all decoys marked on old maps, or referred to vaguely in literature, are necessarily pipe decoys in the Dutch tradition. Some are merely unsophisticated traps or cages. In the details which follow, all the decoys, except perhaps Tickhill and Denaby, are believed to have been true pipe decoys.

1. Doncaster Decoy

The Doncaster Decoy on Balby Carr (a part of Potteric Carr) at map reference 585011 was described by Nelson (1907) as: "the most ancient decoy of which any reliable information has been preserved". Although this statement may not in fact be true, this decoy is certainly one of the oldest documented. Three nineteenth century authors have left us useful descriptions of Potteric Carr.

Baines (1822) wrote: "Potteric Carr on the south, which till the year 1766, was entirely a morass extending about four miles in length and nearly three in breadth from east to west, is now completely drained, and covered in summer with luxuriant crops." Hunter (1828), under the heading "Pottery Carr" wrote: "In the level and low-lying lands are several large morasses, of which that called Pottery-Carr is one. It lies to the south of Doncaster, extending towards the villages of Loversal and Rossington. The extent is about four thousand acres. Portions of it are called Balby Carr, Loversal Carr, High-Ellers Carr, from the names of the villages near where it is situated but the term Pottery-Carr is given to the whole." In 1863 Sheardown described Potteric Carr in the following terms: "Previously to the year 1771 the adjacent carr was a watery morass, with a decoy in its midst, the resort of the crested heron, osprey, moor buzzard, crane, bittern, ruff, mallard, teal, widgeon, and other birds of similar habits: and it was the fertile source of ague, intermittent fever, and other diseases arising from marsh malaria".

In 1639 a certain Edward Rennick left a bequest of £100 to be administered by Doncaster Corporation for the benefit of Doncaster's poor. The Corporation agreed to expend this sum plus £60 besides in 1657 to construct a decoy on Balby Carr, the profits of which (all?) were to be distributed to the poor. It was resolved that if the scheme failed, then the £160 would be restored by the Corporation and put to another use which would more effectively help the poor. In 1662 the completed decoy was leased for 21 years to Mr. Benjamin Marshall. In 1684 Mr. John Maddox leased the decoy for seven years, followed by Mr. James Thwaites, also for seven years. The Corporation records state in 1696: "Leased to Peter Hudson and William Whitaker of Doncaster, Aldermen for 11 years from 1st August last of . . . Decoy on Paltrey Carr . . . and two houses built thereon, with all manner of fowl, thereto resorting, at a yearly rent of £18." In 1707 it was let to Mr. Roger Gough for 21 years, and after this letting, a lease was sealed which allowed Viscount Gallwey to rent the decoy and decoy bank for 31 years. Gallwey died in 1751. In 1772 it was noted that "The Decoy was repaired and the walks improved", but it seems to have ceased functioning around 1778.

Many of the ornithological references to this decoy were noted down by Hugh Reid, a Doncaster taxidermist operating from about 1812 to 1860. His notes were incorporated by writers like Nelson and Hatfield. "In the early career of the decoy the carrs swarmed with geese, pochards, pintails and other congenerous fowl, whilst grebes and divers were proportionately numerous" (Hatfield 1866). This list of carrland birds — breeders and migrants — was impressive, and besides wildfowl, species like Bittern, Marsh Harrier (the "moor

buzzard") and Ruff bred. Gunners, including punt gunners, took their toll, and no doubt there was much trapping, but certainly the operation of the decoy was the most organised method of harvesting the avifaunal wealth of the area.

The decoy was circular in shape, and embraced a pool 6 acres, 3 rods and 27 perches in area. Six pipes radiated from the pool. Nearby was the Old Eaa Lake which at times of drought occupied about 100 acres, and which during flooding extended over the whole carr system. The Old Eaa was however, regularly fished, and there was easy access to its banks, thus it was too disturbed for birds. So the decoy lake acted as a refuge, being sufficiently quiet to allow birds to congregate. The formation of the decoy led to the planting and growth of alders and willows. On the margin of the pool grew osiers as a barrier to prevent the escape of the tame decoy ducks and around the perimeter of the decoy was a raised embankment and an outer encircling ditch. Alongside the pool was a grass walk, obscured by matted hurdles. Along one side of each pipe reed screens were placed to prevent the birds seeing the decoyman. He had a hut nearby which consisted of two rooms formed of wood, covered with bracken and ling, and which, according to Hatfield (1866) was reached by boat (though this was presumably not so after the construction of the decoy bank). The hut was protected by the bushes and trees in the vicinity, and the decoyman was to be found there half an hour before dark.

The alders and willows furnished so much cover for the Mallard that they bred close by and thus enticed others. Mallards began to congregate about the decoy soon after midsummer, mainly involving those that had bred in the district. About the first week of September the Teal arrived. Wigeon were first noted around 13th October, and it was in this month that the fowlers and decoyman made their preparations. From 30th October to the second week of November "immense" numbers of birds were observed and this was the signal for the fowlers and decoyman to commence their "nocturnal operations".

Wigeon were caught in large numbers, as were the other surface feeding ducks, and even geese were caught at times. Ducks were most abundant and in best condition towards Christmas and sometimes in January. During a "freeze-up" the decoy was presumably of little use and under these conditions the gunners took their toll, for only when frozen were the carrs really accessible, usually from late November or early December until January or February. During these months, especially on moonlit nights, they exacted a heavy toll as the birds flew to their nocturnal feeding grounds on the rivers, bogs and meres. Interestingly, Hatfield mentioned that if the winds were easterly at the beginning of October there occurred "a flight of fowl from foreign countries".

Birds captured at Doncaster Decoy were marketed in Doncaster and elsewhere. The decoy bags were sometimes considerable — up to 300 caught at one time. The surface-feeding ducks no doubt accounted for most of the decoy bags but other species were involved as well. It is known for example that Pochard were taken in the decoy, aided by a special contrivance designed to take them: "Roger Gough made use of a clever invention to secure the pochard. He had poles erected at the avenues to the decoy. And after a great number of these birds had collected on the water, to which wildfowl resorted only by day, and go to the neighbouring fens to feed at night, a net was at a given time raised by pulleys to the poles beneath which a deep pit had previously been dug. As the pochards, like the woodcocks, go to feed just as it is dark, and are said always to rise against the wind a whole flock was sometimes taken in this manner. For if once they strike against the net they never attempted to return, but flutter down until received into the pit, from whence they could not rise. Thus we are told twenty dozen have been taken at one catch." (Hatfield 1866). Perhaps this worked with other diving ducks, although species like Pochard, Scaup, Tufted Duck and Goldeneye, along with the geese, were no doubt pursued mainly by the gunners in their gun punts. Species like Coot and Moorhen probably also figured in decoy bags, especially as Hatfield stated: "Moorhens, water rails and coots were sometimes countless around the decoy."

The same author tells us that Grey-lag and Bean Geese visited the decoy in "immense multitudes" and Pink-feet and White-fronts were also shot. It is worth remembering that Bean and Pink-footed Geese were often confused in the nineteenth century and records of these two tend to be unreliable.

Increasingly in the eighteenth century there was disturbance at the decoy. The commoners' cattle for example caused problems. When Viscount Gallwey took over the lease of the decoy he promoted staghunts and foxhunts over Potteric Carr. After the death of Gallwey in 1751 the idea of draining the carr was revived. In 1764 an Act for draining Potteric Carr was passed, and Robert Hudson was asked to value the decoy. An engineer named John Smeaton entered into an agreement with Doncaster Corporation to drain the carr, thus signalling the end for the decoy, since in 1766 the drainage of the carr commenced on a massive scale. The decoy was abandoned about 1778, when the carr, except for the decoy and Old Eaa area, was under agriculture. The Old Eaa was drained in 1790 and partially planted. The decoy was planted with trees in 1805 and in 1849 the Great Northern Railway Company built a railway across the Carr which cut right across the Old Eaa plantation and the decoy site obliterating the latter.

2. Denaby Decoy

Little is known of this decoy, situated at map reference 598013 and despite searches by several workers, nothing of significance has been culled from the literature. Limited cartographic evidence shows that the decoy was present *ca.* 1850, though the map shows no evidence of pipes. The decoy at that time was partially surrounded by woodland very close to the race of Melton Mill, along the course of the River Dearne existing then, just north of Dearne Bridge.

Nowadays this area has changed completely, though the decoy pool is still recognisable. It is an embanked pool, roughly circular, with a diameter of *ca.* 45 metres, dominated by reedmace. It is very overgrown and thus difficult to trace its exact shape. On the side opposite the old course of the Dearne are two "indentations" in the circular margin, one facing north, the other north-east, which may conceivably represent the remains of pipes.

This part of the Dearne Valley was subjected to quite severe flooding, exacerbated by the backing up of the floodwater when it could not drain into the equally flooded Don valley (Hague 1970). Very few ornithological references are to be found for this region before 1940, though two early Bittern records indicate its likely richness. However, as stated above, the effectiveness of the decoy was probably hampered by frequent winter flooding, which may even have been the reason for it being abandoned.

3. Tickhill Decoy

A decoy is marked on the 25 inches scale Ordnance Survey map published in 1929 at reference 609935, in Honey Spots Plantation near Tickhill Spital Hill, close to a marshy area. A circular structure within the plantation is marked "Decoy", but it was unlikely to have been a true pipe decoy.

4. The Decoys of Thorne Moors and Goole

The Dutch population imported into Hatfield Chase seems to have been amongst the first in Britain to introduce the technique of decoying, and Doncaster Decoy on Balby Carr was perhaps constructed in imitation of earlier decoys erected on the newly though imperfectly drained chase nearby. The known decoys constructed on the partially drained chase were all situated on or close to Thorne Moors (sometimes referred to as Thorne Waste). This name includes here Goole Moors and Crowle Moors. It is a desiccating peat bog, originally surrounded by much poor, marshy ground, most of which has now been reclaimed, usually by the method known as "warping".

Davis and Lees (1880) described Thorne Moors in the following way: "Together with Goole Moors, conterminous with it, the line of division being merely the Blackwater Dyke, the Waste covers even now an area of some ten square miles, and formerly it was much larger. This tract, very nearly at sea level, presents to the eye a dreary expanse of level peat moss, intersected by numerous dykes of almost stagnant water, diversified by a few pools or "wells", and relieved in a few places only by oases of soil, a foot or two higher than the plain, on which grow a few Firs, or a thicket of Birch and Alder, or a few bushes of Bog-myrtle and

Sallow. Nevertheless however depressing on a hot summer-day, from its lack of shelter and rare opportunity for quenching thirst the Waste offers at such a time a rich harvest to the botanist sufficiently enthusiastic to spend a dozen hours in the gathering of it, undeterred by the many discomforts the investigation undoubtedly entails."

Payne-Gallwey (1886), in his survey of duck decoys, wrote of Thorne Moors: "This waste is an extensive morass of about 6,000 acres, 500 of which have been apportioned to Crowle; its depth averages 12 to 15 feet, and in some places many more, a fact attributable to the fine qualities of the soil beneath. . . . In various parts of the moor, especially the central, are small lakes or pools of water, upon the margin of which Wild Ducks and the Black-headed Gull *(Larus ridibundus)* breed. Wild Geese also frequent the moor, as do Plover and other birds . . . numerous bog plants and mosses are to be found on the moor; but, through the cutting of drains and ditches, many of these are gradually becoming extinct. The *Drosera*, Sundews, the *Ericae*, Heaths, the *Andromeda Melampyrum* or Cow Wheat, and *Myrica Gale* are abundant as are various *Carices*, but not the *Osmunda*. This moor is being gradually reclaimed by the process of warping and other means, and from the peat, charcoal is now extensively manufactured and sold for agricultural purposes."

There are a number of references — some incidental — to the decoys of this area. The earliest reference to a decoy actually on or around Thorne Moors is that of Stonehouse (1839): "and the different species of wild duck are now caught in that most efficient of all methods of taking them, the decoy. One of these engines of destruction is regularly worked during the season, about a mile from the town of Crowle. Besides the mallard, and the common duck, I have seen specimens of the scaup duck, the shieldrake, the pin-tailed duck or sea pheasant, the swallow-tailed shieldrake [long-tailed duck] and the pockard, or great headed widgeon".

In the same book, Stonehouse added later: "Since these enclosures [the last in 1816] the commons [in the Manor of Crowle] which were before in a wretched and unprofitable state, have been greatly improved. Considerable portions of them, especially on the Crowle Moors, have been warped; by which process land, in its original state not worth owning, has been converted into a soil of the first rate fertility". He goes on: "About 1500 acres have been warped, at the expense of £25 per acre; and when the whole is completed, above 2000 acres will have been brought into cultivation. A small decoy yet lingers on part of the common, which remains uncovered with warp, where a few wildfowl are occasionally taken. . . ." There seems to be a considerable time lapse between the two references, since Stonehouse was optimistic about the future of the decoy in the first reference, and decidedly pessimistic in the second.

Chronologically, the next reference is the six inch scale Ordnance Survey map of 1854. On this, at reference 752154, a four pipe decoy is marked, and named "Crowle Decoy", on the moors some two and a half miles from Crowle. The remaining references all come from nineteenth and early twentieth century literary sources, and are listed chronologically.

Clarke and Roebuck (1881), in their book on the Yorkshire vertebrates, wrote: "On Thorne Waste was also the site of a small decoy fairly productive of mallard, wigeon and teal, especially the latter. This decoy, of which no record is to be found, possessed three tubes, according to Mr. H. W. T. Ellis, of Crowle, who has seen it in operation, and states that it ceased to exist about fifty years ago".

Payne-Gallwey (1886) in his book about the British duck decoys wrote that a decoy "was on the moor some two miles west of Crowle," and added "There are no records of the Decoy or its successes, but Mr. Henry Ellis, of the Manor House, Crowle, distinctly recollects it in use, and to him I am indebted for what few notes I can supply of it. . . .

In 1836, the Decoy was in full work; it ceased to be used about the year 1840, as by that time a considerable extent of the moor had been drained. The Decoy was an acre in extent, and had three pipes as well as a Decoyman's hut close by. Its site is now almost indistinguishable, and is covered with small beech-trees, and various mosses and other products of the moor, but Mr. Ellis tells me that, knowing its exact position, he has no difficulty in finding it".

Payne-Gallwey also mentioned another decoy, quite separate from the aforementioned, as

follows: "In 1880 the late Mr. Durham, who owned a large part of Thorne Waste, partly constructed a small Decoy on a portion of the moor known as "New Zealand", near Thorne. It was made on the plan of the Decoy at Ashby but was never propertly worked and is now out of order". The Ashby decoy was one of four pipes.

In Miller's list of plants for the area (Miller 1895) he talks of *Scheuchzeria palustris* L. being found on "Thorne Waste" in 1840: "Most abundant at a little pool nearest the Decoy". Bunker, a decade later, wrote: "Near Crowle a duck decoy was worked to a comparatively recent period, but the pond and pipes are now filled up with sphagnum and other plants". Nelson (1907), merely quoting what Payne-Gallwey had written, added nothing new.

Woodruffe-Peacock (1920b) mentioned the decoy referred to by Stonehouse, stating: ". . . he refers to a former decoy, now buried below warp (or Estuarine-Alluvium), about a mile from the village of Crowle. This spot was geographically in the county of York, though I was told in 1874 the fowl from it flighted nightly over Lincolnshire to feed on the Humber marshes. This decoy and the quaking bog around it. . . . I now find . . . was about a mile from Crowle Church".

The same author (1920–21) in his paper on the ecology of Thorne Moors made several references to the decoys there, of which "there were six". Later he referred to: "*Betula tomentosa*, still existing. On the Thorne side, and till 1880, and perhaps till now, by Crowle 'New Decoy'. By a slip of the pen they are called Beeches by Sir. R. Payne-Gallwey. The Beech cannot grown on peat". Regarding the occurrence of *Scheuchzeria*, Woodruffe-Peacock examined the evidence for its occurrence in the Crowle turbaries (warped over about 1842, the area is now called the Warpings). He stated: "This spot was warped because it was the lowest ground — the turbaries having cleared off the peat — this species fitting home was practically destroyed in this area. It should be noted that these turbaries began within a quarter of a mile of the village of Crowle, and like the decoy said to have been there too, belong to the seventeenth century, as well, no doubt, as a later date.

There is another point of confirmation: Dr. Ellis and the Rev. J. K. Miller both name a decoy close to Crowle, and the Doctor implied that it had been warped over and buried with the turbaries years earlier. Now there are or were at least six decoys on Thorne Waste, with this one of Messrs Ellis and Miller — two near Goole, two near Thorne, one on the moor, in Yorkshire, two and a half miles from Crowle, from which the turf is being cut off now for warping. Archdeacon Stonehouse's *History of the Isle of Axholme*, p. 68, says there was one within a mile of Crowle, which was called even in my day "Crowle Decoy" by old men, who could remember it before it was warped over. In which country it was I cannot say, but I believe in Yorkshire on the border. This could only be possible if it were due west of the village where I understand it was. . . ."

Woodruffe-Peacock later mentioned Henry Ellis, who: "in 1880 supplied [Payne-Gallwey] with certain information re Crowle 'New Decoy' as I call it, 2.5 miles away on the waste. As printed, not quite accurate; I cannot believe that he said Beech for Birch, which was the species there".

The references quoted, and Woodruffe-Peacock's summary, require some explanation and a brief historical commentary. His two decoys near Goole are presumably those named in Payne-Gallwey as Goole Old Decoy and Goole New Decoy, although neither was strictly on the peatlands, both being situated in the marshy region known as Dikesmarsh and Greenland, located between Thorne Moors and the River Don. Goole Old Decoy appears on several early maps including Ellis's map of 1766, and Payne-Gallwey wrote of it: "A Decoy that has not been worked since the early years of the present century, existed near the south bank of the Dutch River, near its junction with the Humber at Goole, six miles NNE of Thorne, on a large extent of marsh, in those days known as Greenland. A farm called the Decoy Farm, still marks its position, and a house close by the latter, at one time an inn, had for its sign "The Dog and Duck" — a name possibly suggested by the vicinity of the Decoy. Some few years back the shape of this decoy was easily to be traced, but it is now grown up and lost to view". The map reference of the farm is 716215, though the decoy was probably somewhere around 717208. The Goole New Decoy was apparently four miles west of the

position of the other Goole decoy, as given by Payne-Gallwey, also on the south bank of the Dutch River. Payne-Gallwey considered the appelation "New" referred to it being possibly started in rivalry or to take the place of the "Old" decoy, early in the nineteenth century. Since the name "Old" could not be applied until there was a second, newer decoy, it is possible that the name "New" came from the fact that the "New" Decoy was built near New Bridge, where the Dutch River meets the River Don; perhaps originally called "Goole New Bridge Decoy", this name was later inevitably contracted to Goole New Decoy.

Woodruffe-Peacock referred to two decoys "near Thorne". One is simply unknown; the other is presumably that of Makin Durham at New Zealand, which was partly constructed and then abandoned in the early 1880's. This leaves us with two further decoys to account for, those mentioned by Woodruffe-Peacock as Crowle Decoy (subsequently called Crowle Old Decoy in this paper) and Crowle New Decoy.

Crowle New Decoy, "on the moor in Yorkshire, two and a half miles from Crowle", would, by its position, be the same decoy as that which appeared on the map of 1854 (but as "Crowle Decoy"). Bunker's (1905) reference apparently also related to Crowle New Decoy.

Do all the remaining historical references previously quoted refer to the remaining, sixth, decoy on Woodruffe-Peacock's list, the so-called Crowle Old Decoy? It is highly probable. Stonehouse seems to be relating details about only one decoy "about a mile from the town of Crowle". He was pessimistic about its future so it probably ceased functioning in the early 1840's. Chronologically, the next reference is Clarke and Roebuck (1881). This too seems to relate to Crowle Old Decoy, since the reference states that the decoy ceased to exist around 1840 and had only three pipes (Crowle New Decoy had four according to the 1854 map). Clarke and Roebuck's informant was a Mr. Henry Ellis, who was also Payne-Gallwey's (1886) informant; the latter author mentioned three pipes and the demise of the decoy about 1840, apparent references to Crowle Old Decoy, which we know from Stonehouse was about one miles from Crowle; and according to Woodruffe-Peacock (1920b) this mile was measured from Crowle Church. Payne-Gallwey however, stated that the decoy was "on the moor some two miles west of Crowle", seemingly a reference to the other decoy, Crowle New Decoy. Has some confusion crept into Payne-Gallwey's book so that he has merged details of both Crowle Old Decoy and Crowle New Decoy inadvertently into one? It seems to be the only explanation for the anomaly.

Woodruffe-Peacock (1920b), referring to Crowle Old Decoy, the decoy mentioned by Stonehouse, said it was one mile from Crowle Church, in Yorkshire, and apparently abandoned when its site and/or the area around it was warped, adding: "It should be noted that these turbaries began within a quarter of a mile of the village of Crowle and like the decoy said to have been there too, belong to the seventeenth century, as well, no doubt, as a later date".

Woodruffe-Peacock (1920–21) also stated that the details given by Payne-Gallwey related to Crowle New Decoy. Accepting the confusion in Payne-Gallwey's statement in that he seems to merge the data on both 'Crowle' decoys together, perhaps Woodruffe-Peacock was misled too; unfortunately, with the present state of our knowledge, the anomaly must remain unsolved.

Notwithstanding the uncertain nature of these decoys, their number — "at least six" — is remarkable. The area both west and east of Crowle was obviously very productive of wildfowl, judged by the number of decoys, for others existed east of Crowle in Lincolnshire, outside the area under study. Ashby Decoy, slightly more than six miles south-east of Crowle just over the Trent, is unusual in having a set of records still surviving. These, which date from 1st September 1833 to 1st February 1869 show the likely productivity of decoys in the Thorne/Crowle area. The decoy was described as small, but in those 35 years the following were taken:

Pintail	—	283
Shoveler	—	292
Wigeon	—	2,236
Teal	—	46,286
Mallard	—	49,798

Also taken were small numbers of Garganey and Gadwall, and taking into account the multitude of ducks that must have escaped the nets — as Cordeaux (1872) mentioned for example under Shoveler and which also must have applied to diving ducks — the large numbers involved are clearly demonstrated.

Considering the evidence presented here, it is obviously necessary to amend the most recent review of of Yorkshire's decoys, which is given by Nelson in his county avifauna (Nelson 1907). He gave details of Doncaster Decoy, Goole Old and Goole New Decoys, New Zealand Decoy and Thorne Waste Decoy. This latter corresponds with both Crowle Old Decoy and Crowle New Decoy both of which were in Yorkshire prior to 1888, since he had followed the apparently confused information given by Payne-Gallwey (1886). References to counties in this context are probably unreliable. Until 1888 the county boundary ran along the old course of the River Don, so that Crowle Moors was in Yorkshire. This was changed in 1888 so that in effect Crowle Moors became a part of Lincolnshire. Thus on Nelson's list, his 'Thorne Waste Decoy' should be split into its two component decoys, and to the list the Denaby and Tickhill decoys should be added, as well as the unknown decoy "towards Thorne". All these decoys have, within the last two centuries, been in Yorkshire, though minor boundary changes have created confusion about the comital status of some of them, and to this confusion has been added further uncertainty in the literature about the precise details known of each one.

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NATIONAL BADGER SURVEY: REPORT FOR SOUTH AND WEST YORKSHIRE

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Since the last report in the *Naturalist* (1972: 7–10) concerning the status of the badger in Yorkshire, some important changes have occurred. The county boundary has changed and the Ridings have been replaced. John Knight, the former recorder for the North Riding, is now recorder for Cleveland, and Adrian Middleton, who was recorder for the East Riding, now records for North Yorkshire and Humberside. The former West Riding recorder (R. J. Paget) now covers South Yorkshire, and there is a new recorder (P. N. Patchett) for West Yorkshire; it is the sharp decline in badgers in these two counties which is discussed in this paper.

Since 1973 the badger has been a protected animal by Act of Parliament, yet in spite of this there has been a most serious reduction in number of setts and badgers since the last report, mainly due to continued persecution both digging and gassing.

The density map of setts in the last paper was brought up to date in "Badgers of Yorkshire and Humberside" (R. J. Paget and A. L. V. Middleton, 1974, York) mainly through increased knowledge of the specie's distribution in North Yorkshire, that in South and West Yorkshire remaining similar. At present there are 278 known setts (both active and inactive) in South and West Yorkshire combined, but whereas 81% of these were occupied setts in the mid-seventies, *only 38% are now so.* The reduction is more marked in West Yorkshire where the fall is from 91% to 34% (see Table 1).

Why has this dramatic reduction occurred? Certainly the number of deaths on the roads has increased with rising numbers of vehicles and the coming of the motorways, and some setts have been destroyed by urban spread, open-cast mining and burying by refuse tipping. These instances can be termed the "unavoidable" influence of man. Very much more important however is active persecution by gassing and digging. Gassing kills practically all the residents in the sett at the time, which in the spring will include cubs and in the winter pregnant sows, thus destroying the sett's potential for supplying young animals for dispersal to other setts later that year or next. Gassing appears to be more common in West Yorkshire.

Badger digging is rife where the terrain is suitable, and when repeated time and again leads to sett destruction and either death or dispersal of occupants. Digging is both more common and more intense than formerly with gangs of men going out repeatedly week after week; in the Rotherham and Doncaster districts, whole areas are now devoid of badgers where formerly they were relatively common. For example virtually every sett in the parishes of Cadeby, Denaby, Hooton Roberts, Conisbrough Parks, Ravenfield, Wadworth, Stainton and Hooton Levitt have been reduced to lifeless mounds and pits; and the previously secure setts of Thorpe Salvin, Harthill and North and South Anston are now being attacked.

	South Yorkshire. 162 Setts.		West Yorkshire. 114 Setts.	
	% Active	% Inactive	% Active	% Inactive
1970–76	75	25	91	9
1977–78	41	59	34	66

Table 1. Percentage decline of active badger setts in South and West Yorkshire.

As well as these causes there may be others operating in reducing the badger population such as smaller litters born and a higher death rate in early life, also an overall reduced life expectancy. Very little is known about this, but the stress produced by repeated interference to the sett by digging and gassing may play a part; certainly badgers behave differently after disturbance, and stress may lead among other things to failure of the sow to come into oestrus, absorption of fertilized ova or blastocysts, or failure of these to implant, the orphaning of cubs and altered pattern of behaviour such that a road fatality becomes more likely.

Setts near roads in good view of the public are not as frequently disturbed by digging and gassing procedures, but it is these very setts where accidental deaths are highest, and they rely for restocking upon surplus badgers from other setts: if the latter have been wantonly destroyed then no recolonization of the former can occur and they too eventually become uninhabited.

The number of active setts in some areas of South and West Yorkshire is virtually unchanged where there is a natural defence from digging and to a lesser extent from gassing; for example old mine working setts to the west of Sheffield and south of Huddersfield, and those amongst large gritstone rocks are too difficult for digging out. Setts in gardens, close to farms and in open situations enjoy greater safety than those hidden in woodland, and setts protected by interested land owners such as the Forestry Commission are safer, but even here there is no room for complacency.

The past few years have seen a serious reduction in badger numbers in both West and South Yorkshire. Probably the rate of decline will steady now that the easier and more accessible setts have been destroyed; nevertheless we feel there remains cause for anxiety, urging vigilance on all, so that the Badger Act can be enforced before the species becomes a rarity in these parts of Yorkshire.

H. M. LIVENS LICHEN COLLECTION AT BOLTON MUSEUM: NOTES ON SOME INTERESTING SPECIMENS

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Royal Botanic Garden, Edinburgh

A short biography of the Rev. H. M. Livens and an outline of the contents of his lichen herbarium at Bolton Museum is given by Seaward (1978). Several of the specimens are of special taxonomic or phytogeographical interest, and notes on these are given below.

Arthopyrenia areniseda A.L.Sm. The collection contains two packets labelled '*Arthopyrenia areniseda* A.L.Sm. spec. nov. Damp sands, Freshfield, nr. Southport, Lancs. J. A. Wheldon. March 1910. PARATYPE.' Unfortunately, careful examination failed to reveal any healthy ascocarps.

Arthopyrenia subareniseda G. Salisb. (as *A. areniseda* A.L.Sm.) maritime sands in Ainsdale, S. Lancs, June 1909, J. A. Wheldon. This collection agrees in every detail with the type description of *A. subareniseda* (Salisbury, 1953) and is from the type locality. *A. areniseda* was originally collected by Wheldon from the same dune system, but has much larger spores.

Caloplaca alociza (Massal.) Mig. (as *Lecanora variabilis* var. *ecrustacea* Nyl.). shore [on limestone], Silverdale, West Lancashire, V.C. 60, March 1911, J. W. Hartley. In Britain this species has been confused with *C. variabilis* which has an epilithic, cracked-areolate thallus and sessile apothecia with a distinct, grey thalline margin. *C. alociza* is characterised by an entirely endolithic thallus and black, often white pruinose, apothecia without a thalline margin. A detailed revision of the black-fruited saxicolous species of *Caloplaca* is given by Wunder (1974).

Caloplaca caesiorufa (Wibel) Flag. (as *C. ferruginea*) on Godshill Church, Isle of Wight, 11 May 1908, H. M. Livens.

Caloplaca viridirufa (Ach.) Zahlbr. Ruan Manor [Cornwall], 30 April 1914, H. & K. Livens. This apparently very rare species has not previously been reported from south-west England.

Cladonia phyllophora Hoffm. (as *C. verticillata*) amongst rocks, Hurlstone Point, Somerset, Aug. 1908, H. M. Livens. The specimen was found by thin-layer chromatography to contain fumarprotocetraric acid only.

Cladonia scabriuscula (Del. ex Duby) Leight. (as *C. pungens* var. *foliosa*) Deer Park, Kirkcubbin, Co. Down, J. Glover, 11 Dec. 1909. New to V.C.H38; *C. scabriuscula* is a local and much overlooked species.

Cladonia zopfii Vain. (as *C. uncialis*) heath, New Forest, 25 March 1910, H. M. & R. G. Livens. The two packets do not give more precise locality information. However, the collection may well have been made in the vicinity of Bramshaw Wood because the herbarium contains several collections of other species from this site, made on the same day. This is the first record of *C. zopfii* (syn. *C. destricta* auct., non (Nyl.) Fisch.-Benz.) for southern England. It was collected in Yorkshire in the mid-nineteenth century by William Mudd (British Cladoniae Exs. 63 and 64; Lich. Brit. Exs. 18) and by Carrington (from Ilkley; specimens in E), but there are no modern records from England. *C. zopfii* was considered extinct in Britain by Hawksworth, Coppins and Rose (1974) but a close study of material in the *Cladonia uncialis* folder in the Royal Botanic Garden, Edinburgh (E) has revealed four post-1960 collections: South Uist (V.C.110), Applecross (V.C.105) and two from the Cairngorm Mountains (V.C.92). *C. zopfii* resembles *C. uncialis* subsp. *biuncialis* (Hoffm.) Choisy (syn. subsp. *dicraea* (Ach.) D. Hawks.; subsp. *uncialis*, which has predominantly tetrachotomous branching, is probably not found in Britain) but

differs in the close axils between its branches and the longitudinally fissured appearance of the inner surface of the hollow podetium. This character is best observed with a dissecting microscope at between × 20 and × 50 magnification. The branches of *C. uncialis* usually have open axils and the inner surface of the podetium is more or less smooth. The two species also differ in chemistry; *C. uncialis* contains squamatic acid so that the inner surface of the podetium gives a brilliant white fluorescence in ultra-violet light (UV, 366 nm), whereas *C. zopfii* lacks this substance and is UV−. After several months in the herbarium the podetial tips of *C. zopfii* usually become bluish-white due to the formation of minute, needle-like crystals (possibly a diterpene), but no such crystals are developed by *C. uncialis.* Both species contain the yellow-green pigment usnic acid, although *C. zopfii* generally has a duller and greyer appearance in the field. The taxonomy of *C. zopfii* and its close relatives is discussed by Ahti (1973).

Icmadophila ericetorum (L.) Zahlbr. (as *Baeomyces roseus*), peaty bank, Bramshaw Wood, New Forest, 6 April 1911, H. M. & R. G. Livens. This is so far the only record of this species for the New Forest. The specimen belongs to the chemical race containing thamnolic and perlatolic acids; another strain containing thamnolic acid only is also known from Britain (P. W. James, *in litt.*).

Leptogium turgidum (Ach.) Cromb. (as *Collemodium turgidum*) Seal, near Sevenoaks, Kent, Dec. 1908, E. M. Holmes. The specimen is abundantly fertile and probably correctly named, but there is much confusion over the taxonomy of this group at present.

Lobaria amplissima (Scop.) Forss. The herbarium contains two specimens from Bramshaw Wood, New Forest: one collected in 1910 by H. M. and R. G. Livens, and the other in 1914 by H. M. Livens. Only the 1914 collection, which was on *Fagus*, bears the blue-green algal morphotype (sometimes given an independent name *Dendriscocaulon umhausense*). *L. amplissima* is now very rare in the New Forest and was not reported from Bramshaw Wood by Rose and James (1974). Prompted by the knowledge of the Livens material, Dr Rose revisited the wood in November 1976, and with the aid of a ladder found a patch of *L. amplissima* at about 6 m above the ground on an old beech. The patch was about 30 × 18 cm in size and lacked the blue-green algal morphotype.

Melaspilea lentiginosa (Lyell ex Leight.) Müll. Arg. Bramshaw, New Forest, on beech, 11 Nov.1909, H. M. Livens; New Forest, on beech, 18 Dec.1912, H. & K. Livens. Studies on these collections and another five (from New Forest, South-west England and Finistère, France) in E show this species to be a parasymbiont on the thallus of *Phaeographis dendritica* (Ach.) Müll. Arg. Further studies are required to determine if it also occurs on other members of the Graphidaceae. In the 1912 collection above, the ascocarps of the *Melaspilea* occur on fertile thalli of *P. dendritica*. When parasitised, ascocarp production by the *Phaeographis* is greatly suppressed, sometimes totally so. Such a reaction is often a feature of other lichens that are invaded by a parasymbiont.

Pannaria nebulosa (Hoffm.) Nyl. (as *Pannaria* sp.) Lizard [Cornwall], no date, but probably 1914.

Rhizocarpon constrictum Malme (as *R. confervoides*) on flint pebble, pebble-beach, Dungeness, Kent, July 1911, H. F. Parsons.

Stereocaulon saxatile Magnusson (as *S. alpinum*) Ben Muich Dhui [Ben Macdui], 3,800 ft, July 1909, J. A. Wheldon & A. Wilson. The specimen lacks cephalodia, but has dark grey tomentum, whereas *S. alpinum* has pale grey or rose-coloured tomentum.

The herbarium contains many specimens that support the records of Livens included in an account of the lichens of the Isle of Wight by Knight (1933). Three important records therein were based on erroneously determined material:

Collema cristatum (L.) Web. (as *C. granuliferum*) on wall of Carisbrooke Castle, 1907, H. M. Livens. The specimen is *C. crispum* (Huds.) Web.

Collema polycarpon Hoffm. (as *Synechoblastus polycarpus*) on rock, the Landslip, 1907, H. M. Livens. The specimen is *C. tenax* var *tenax* (Sw.) Ach.

Lecanora (Aspicilia) gibbosa (Ach.) Nyl. on flint, Westover Down, 1907, H. M. Livens. The specimen is *L. (Aspicilia) contorta* (Hoffm.) Steiner.

Thanks are due to the Keeper of Natural History at Boltom Museum and Dr. M. R. D. Seaward for making the collections available to me, and to Mr. P. W. James for the TLC examination of some specimens.

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FIELD NOTES

Meum athamanticum Jacq. in the Upper Lune Valley

The Spignel or Meu has long been known in the upper Lune Valley above Sedbergh, and was noted by Parkinson in 1640, Turner in 1664, and Merrett in 1661.

At a Union meeting held at Sedbergh in 1887, a party of botanists set out "under the leadership of Mr. John Handley, of Briggflatts, near Sedbergh, and its special object was to see and gather *Meum athamanticum*, which grows in Howgill. A wagonette was filled and driven to Beckhouses, and on the farmer, Mr. J. Fawcett, being asked if they might go into his field and get some of it, he said "Yes, if ye'll go roond be't yet an' net breck t'hedge," which was agreed to very meekly. The plant was in fruit and growing on a bank in large quantities." Later in the report on this meeting, F. A. Lees writes: "The Spignel, recorded nearly 250 years ago for the locality, was confirmed as occurring in some abundance, but local, in pastures and on broken banks over a restricted area having Beck-houses, near the Lune beyond Howgill, for its centre of dispersion. Being in fruit, the peculiar odour of this aromatic umbellifer, resembling the 'cattle-spice' preparations of Fenugreek (and like them due to Coumarin?), was very noticeable. Local farmers averred they knew not of any surviving employment of it in rural beast-pharmacy; but regarded it as a 'nasty, stinking thing' of 'lile account' which 'yow' and 'kye' alike left uncropped amid the pasturage."

Meum was seen by Y.N.U. bryologists in 1957 in a rough field at Fair Mile Gate (where it still occurs) and in fields at Brunt Syke farm. It is also known in fields near Castley farm, and this year (1977) the farmer at Bramaskew (between Sedbergh and Howgill Church) told Mr. C. R. Haxby and myself that it also grew in his fields. Wilson's *Flora of Westmorland* (1940) has very fine photographs of *Meum* at Dillicarr Common on the Westmorland side of the river, and it still occurs thereabouts (*fide* Dr. D. R. Grant).

G. A. Shaw

Bryological Section Meeting at South Cave, September 1977

The autumn meeting of the Bryological Section of the Y.N.U. was held in the South Cave area on 10th–11th September 1977. Saturday morning was spent in Brantinghamdale 44/93 where old elders in the woodland beside the road yielded the only new V.C. record of the

meeting, *Bryum flaccidum*. In an old quarry was found *Seligeria paucifolia*, and on chalk grassland interesting species were *Fissidens adianthoides*, *Trichostomum crispulum*, *Bryum rubens*, *Dicranum scoparium*, *Weissia spp.*, *Ctenidium molluscum* and *Riccardia pinguis*, while the roadside banks produced *Hylocomium spendens*, *Rhytidiadelphus triquetrus*, *Barbula cylindrica* and *Pseudoscleropodium purum*. After lunch the old railway line along Drewtondale was visited, first examining an old quarry where *Barbula fallax*, *B. tophacea*, *Camptothecium lutescens*, *Dicranella varia*, *Pottia truncata*, *Plagiothecium succulentum* and masses of fruiting *Ceratodon purpureus* and *Bryum argenteum* grew. *Gyroweissia tenuis*, *Campylium protensum* and *Barbula revoluta* were found among rocks above the quarry. On the old railway line *Polytrichum commune*, *P. juniperinum*, *P. piliferum* and *Cratoneuron filicinum* grew in abundance, and *Dicranum strictum* was found on old elders beside the track. At Weedley Springs *Pellia endiviifolia* was growing in luxuriant profusion, and *Pottia davalliana*, *Pohlia wahlenbergii* and *Leiocolea turbinata* were noted. Growing in mud near a stream were *Physcomitrium pyriforme*, *Bryum rubens* and *Leptobryum pyriforme*.

A brief visit to Newbald Springs on the way home revealed a very overgrown area, but *Brachythecium rivulare*, *Mnium punctatum*, *Climacium dendroides*, *Campylium stellatum* and *Riccardia pinguis* were recorded.

Sunday morning was spent in Weltondale (44/92), first exploring chalk woodland where much quarrying had taken place. Everywhere was very dry but *Seligeria paucifolia*, *S. calcarea* were found, and on the woodland floor *Eurhynchium murale*, *Mnium cuspidatum*, *M. longirostre*, *Cirriphyllum piliferum*, *Ctenidium molluscum* and *Eurhynchium striatum*. Hepatics were few, only *Lophocolea cuspidata*, *L. heterophylla* and *Cephalozia bicuspidata* being found, and only in small amounts. Near the dam, *Pottia davalliana*, *P. truncata*, *Dicranella varia* and *Phascum cuspidatum* on wet mud, and on the track *Barbula hornschuchiana* were found.

A visit to the Humber banks near North Ferriby was completely unrewarding.

Altogether 68 species were recorded for 44/93 and 43 for 44/92, both previously underworked squares, on a most enjoyable meeting. My thanks to Mr. T. Blockeel and Mr. F. E. Branson for their lists, and to the landowners who gave permission for us to visit their properties.

M. Dalby

Stranded Dolphins on the Yorkshire Coast

A male Common Dolphin *Delphinus delphis* (L.) was stranded on the rocks at South Landing, Flamborough at approximately 22.30 hrs on 27th November 1977. Although alive when first seen, it was later shot by the Scarborough R.S.P.C.A. inspector because of external injuries and lacerations before being taken to the Department of Anatomy at the Royal Free Hospital of Medicine, University of London by a junior research fellow. Its horizontal length was 205.5 cm (approximately 6′ 9″). A report of the stranding and a photograph of the dolphin appeared in the Hull Daily Mail on 29th November 1977.

The Common Dolphin has a world-wide distribution in temperate and tropical seas and so in British waters is more abundant in the south and west. It is a rare visitor to the east coast. There have been only two previous Yorkshire strandings recorded — a 6′ female at Kilnsea on 23rd December 1936 and one "washed up dead" in early September 1948 at Spurn Point.

On the morning of 30th November 1977 an immature male White-beaked Dolphin *Lagenorhynchus albirostris* (Gray) was found stranded on the rocky shore at Hayburn Wyke about 6 miles north of Scarborough. It was in such excellent condition that it must have died within the previous 24 hrs. Its horizontal length, from the tip of the beak to the notch in the tail fluke, was 216 cm (approximately 7′ 1″). The skull, preserved at Wood End, Museum of Natural History, Scarborough, has 23 teeth on each side of the upper jaw as well as the mandibles which were chipped slightly at their anterior end.

This species is the commonest dolphin in the North Sea occurring in quite large schools and individuals are frequently stranded.

C. I. Massey

TUBER AESTIVUM Vitt. — TRUFFLES GROWING AT HEADINGLEY, LEEDS

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Agriculture Building, The University of Leeds

On the 10th of October, 1977, during the removal of soil from a heap near a glasshouse at the University of Leeds Experimental Garden in the Headingley district of Leeds, within 3 km of the city centre, three fungal fruit-bodies, identified on sight as "truffles", by one of us (K.R.), were found 5 cm below the soil surface and 20 cm from the overhanging branches of a holly tree *(Ilex aquifolium)* forming part of a hedge. Shortly afterwards 4 more fruit-bodies were uncovered 50 cm from the base of a hornbeam tree *(Carpinus betulus)* and about 10 cm below the soil surface. All 7 specimens were in a fresh condition; the largest had a diameter of 5.5 cm at the widest point and weighed 35 g. The pyramidal warts on the outer surface were conspicuous as the soil was shaken from the specimens. The numerous veins within the fruiting body did not seem to arise from any particular point (Fig. 1). Microscopical preparations of asci and ascospores were made in lactophenol cotton blue by Shirley Preece and drawings made by G. M. McPherson. The stalked asci (Fig. 2) contained variable numbers of ascospores, from 1 to 6. The majority were 2–, 3–, or 4-spored. The remarkable reticulate deep sculpturing of the outer surface of the asocspore is shown in Fig. 3, the single unattached "spike" shown in Figs. 2 & 3 being frequently visible. Measurements of the ascospores gave the largest dimensions (in asci containing only 1 ascospore) of 17 μm × 36 μm. Use of the dichotomous key in Hawker (1954) left no doubt that the specimens were of *Tuber aestivum* Vitt. Mr. W. G. Bramley wrote on 12th October 1977 ". . . I have not seen this fungus before, and there are no records for the county (of Yorkshire), but then no-one makes a search for them . . ."

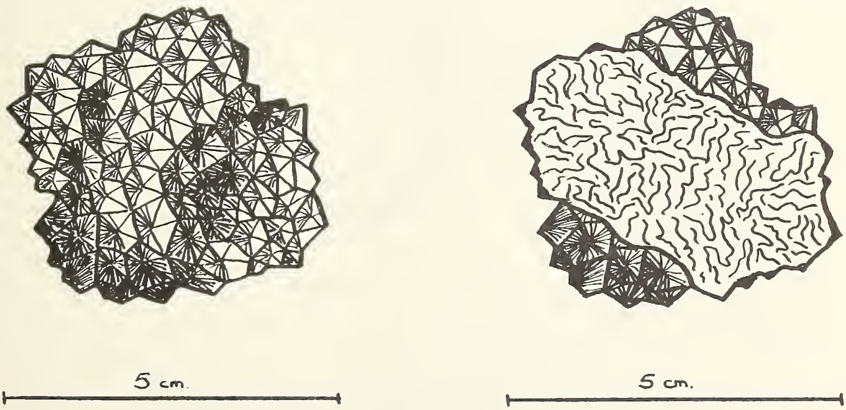

Figure 1. Drawing of one of the specimens of *T. aestivum* found in Leeds. Left: entire; right: cut across showing irregular veins.

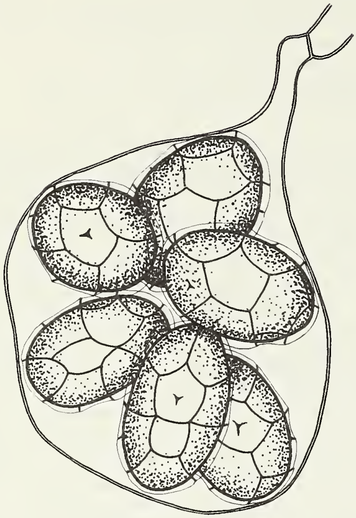

Figure 2.

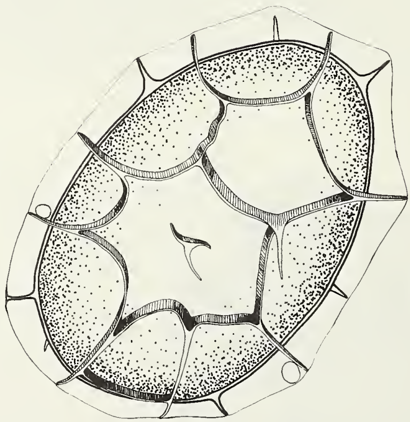

Figure 3.

Figure 2. A single ascus from the fruiting body shown in Fig. 1. The number of ascospores seen in asci varied from 1 to 6. The majority were 2-, 3- or 4-spored.

Figure 3. A single ascospore showing the deep reticulations and a central free spike-like projection. This ascospore measured 17 μm × 36 μm.

There is a record of *T. aestivum* in Massee and Crossland (1905) from near Wetherby, but they took this from Lees (1888), and suggest this very old record could have been of *Elaphomyces*. The only certain record of a *Tuber* species in Yorkshire was noted by Sledge (1957). This was found in a plant pot containing a small pine-tree, and was of *Tuber maculatum* Vitt. It seems that our finding of *T. aestivum* is a new record for Yorkshire. The nearest record is from Bangor, North Wales (Hawker, 1954). There are no more northerly records from the British Isles.

Site Details

The heap of potting-soil in which *T. aestivum* was found was near a glasshouse, and from an investigation of the history of the garden, it seems likely that the heap of soil has been undisturbed for at least 30 years. The glasshouse (formerly used for growing orchids) is clearly marked on the local 1895 O.S. map. At some stage a layer of lime has been deposited in the heap (Fig. 4), which had elsewhere a pH of 7.1. The remainder of the garden soil has a pH of ± 6.5. Nearby trees are shown in the sketch, and a hornbeam overshadows the whole heap. The site is freely-drained and often quite dry. The reasons for the location of *T. aestivum* at this site are obscure. The idea that the fungus was introduced with some horticultural material used in the orchid glasshouse or garden is attractive, but no records are available after so many years. The most conspicuous local rodent on and around this soil heap is the

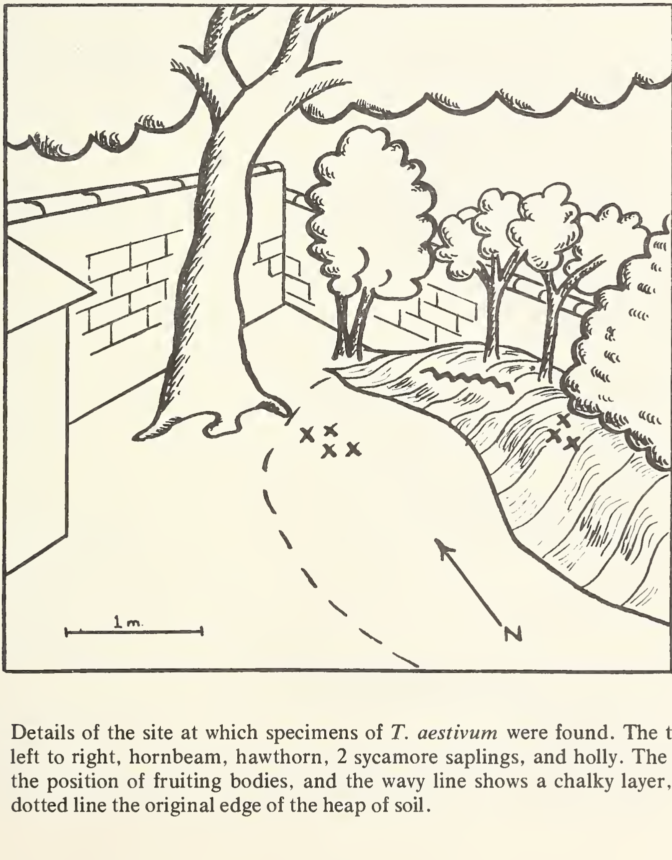

Figure 4. Details of the site at which specimens of *T. aestivum* were found. The trees are, left to right, hornbeam, hawthorn, 2 sycamore saplings, and holly. The x's show the position of fruiting bodies, and the wavy line shows a chalky layer, and the dotted line the original edge of the heap of soil.

grey squirrel *(Sciurus carolinensis)*. Although squirrels eat truffles, it appears that their part in the dissemination of truffles has not been studied.

Looking for hypogeous fungi in Yorkshire might be very rewarding. The best places to look would be on alkaline soils under beech, where the soil is more or less bare of vegetation. Hawker (1954) notes that ash and deciduous oakwoods are usually unproductive of hypogeous fungi in southern England.

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SPRING FUNGUS FORAY

Ilkley, 13th to 16th May, 1977

T. F. HERING

On all counts this was a highly successful meeting. About ten members of the Mycological Section enjoyed three fine days in the field, and were joined by local colleagues at the weekend. We were all grateful to the College for excellent workroom facilities. Above all, we found that damp woodlands were producing a great deal of interesting material, yielding a longer species list than is usual at Spring Forays. I am particularly indebted to Mr. and Mrs. M. C. Clark, who furnished over 70 records of Ascomycetes, and to Mr. P. Earland-Bennett for some 250 records of lichens.

F = Farnley Wood, SE/225583
B = Bolton Abbey, SE/077552
M = Middleton Wood, Ilkley, SE/118488
H = Hudson Wood, Ilkley, SE/122486
I = Ilkley Moor, SE/111468

MYXOMYCETES (M. C. Clark)

Hemitrichia leiotricha H
Leiocarpus fragilis M

MASTIGOMYCETES

Peronospora ficariae on *Ranunculus ficaria* F H

ASCOMYCETES (M. C. Clark, J. Blunt)

Pyrenomycetes

Cryptodiaporthe hystrix on *Acer* H
Diatrypella favacea on *Alnus glutinosa* H F
D. quercina on *Quercus* F
Eutypa acharii M
E. lata B
Gnomonia inclinata F
G. rubi F
Hysterium angustatum on *Acer pseudoplatanus* B
Nectria magnusiana on *Diatrypella favacea* F
N. viridescens Booth M
Nummularia lutea M
Quaternaria quaternata on *Fagus silvatica* B
Trematosphaeria pertusa on *Acer pseudoplatanus* B
Xylaria carpophila B

Discomycetes

Anthracobia maurilabra F
Apostemidium fiscellum F
A. leptospora I
Calycellina phalaridis B
Ciboria amentacea on catkins of *Alnus glutinosa* M
Cyathicula pteridicola M
C. turbinata B
Dasyscyphus apalus on *Juncus* I
D. bicolor var. *rubi* B
D. controversus B
D. diminutus on *Juncus effusus* I
D. dumorum F
D. fugiens B I
D. grevillei M
D. nidulus M H
D. nudipes M F B; and var. *minor* on *Epilobium angustifolium* M
D. pudicella on grass M
D. soppittii F M
Echinula asteriadiformis Graddon (new English record) B
Hymenoscyphus calyculus H
H. repandus M H B
Lamprospora dictydiola B
Lasiobolus ciliatus I
Micropodia pteridina on *Pteridium aquilinum* M F H
Mollisia fallax M
M. hydrophila F
M. melaleuca F
Niptera melanophaea B
Orbilia xanthostigma on wood M F
Pezicula livida F
Peziza ampliata B
P. granulosa F
P. micropus B H
P. praetervisa F
P. repanda F B
P. subviolacea B
Pezizella alniella H
P. chrysostigma I
P. eburnea M B
P. fagi B
P. gemmarum M
Psilachnum inquilinum H
Pyrenopeziza petiolaris F
P. urticicola M H
Rutstroemia conformata H
R. fruticeti M H
Saccobolus versicolor I
Sclerotinia curreyana I
S. hirtella M
S. sclerotiorum M B
Tapesia fusca M
Tricharia gilva B
Unguicularia millepunctata M

BASIDIOMYCETES (R. Watling)

Uredinales

Phragmidium fragariae on *Potentilla sterilis* F
Puccinia major on *Crepis paludosa* B
P. sessilis on *Allium ursinum* B
P. tumida on *Conopodium majus* B
P. violae on *Viola riviniana* F
Uromyces muscari on *Endymion nonscriptus* B M
U. valerianae on *Valeriana officinalis* B

Agaricales

Conocybe aporos B
C. lagopides B
C. subpurpureus B (new British record)
C. truncorum B
Deconica rhombispora (new British record) B
Entoloma aprile B
Galerina ampullaecystis F
Mycena epipterygioides B
Phaeomarasmius erinaceus B
Psathyrella pennata B
P. vernalis B M
Tubaria conspersa M

Aphyllophorales

Athelia bombycina M
A. epiphylla M
Botryobasidium botryosum M
B. subcoronatum M
Corticium evolvens F M
Cristella farinacea B M
Datronia mollis on *Fagus silvatica* F B
Hyphoderma praetermissa M
H. tenue M
Hyphodontia sambuci M
Lachnella villosa H
Radulomyces confluens B M

Heterobasidiomycetes

Calocera pallidospathulata on *Larix decidua* M
C. stricta M
Exidia plana F

FUNGI IMPERFECTI

Acrogenospora sphaerocephala M
Botrytis globosa B
Melanconium bicolor on *Betula* F
Osteomorpha fragilis Arnaud on *Cristella farinacea* M (new British record)

LICHENS (P. Earland-Bennett)

Alectoria fuscescens on *Quercus* B
Arthonia didyma on *Ulmus* B
Bacidia vezdae on *Ulmus* B
Biatorella pinicola on *Sambucus* I
Coniocybe furfuracea on soil M
Cladonia luteoalba on Millstone Grit wall B
Clathroporina calcarea on Millstone Grit B
Endocarpon pusillum on rocks in river B

Lecidea cinnabarina on *Acer* B
Lepraria membranacea on *Quercus* B
L. zonata on Millstone Grit B
Ochrolechia turneri on Millstone Grit B
Opegrapha vermicellifera on *Ulmus* B
Parmelia laciniatula on *Acer* B
Pertusaria pseudocorallina on Millstone Grit B
Polyblastia allobata on *Ulmus* B
Thelotrema lepadinum on *Quercus*, *Ulmus*, *Acer* B
Toninia caradocensis on *Quercus* B
Usnea subfloridana on *Fraxinus* B
Verrucaria hydrela on rocks in river B

YORKSHIRE NATURALISTS' UNION EXCURSIONS IN 1977

COMPILED BY A. HENDERSON

BILSDALE, V.C.62 — 28th–29th May

Vascular Plants (J. E. Duncan)

Saturday morning's route was from Chop Gate to Sleave Green, Stonehouse Cote and William Beck Farm, Raisdale Beck being visited in the afternoon. On Sunday the walk taken was via William Beck Farm and Black Intake to Tripsdale, returning by Oak House. Sleave Green lies in the 10 km grid square 45/50; all other records are from localities in square 44/59. Species not recorded in the *Atlas* for either one or both of these grid squares are indicated below by an asterisk.

Ribes alpinum (Mountain Currant) grew near Sleave Green, where nine species were added to the *Atlas* records for 45/50.

In Tripsdale *Thelypteris limbosperma* (Lemon-scented Fern), *Trientalis europaea* (Chickweed Wintergreen), *Vaccinium vitis-idaea** (Cowberry), *Corydalis claviculata** (Climbing Fumitory) and *Drosera rotundifolia** (Round-leaved Sundew) were found. *Ranunculus omiophyllus* (Round-leaved Crowfoot) was growing in a track-side pool and *R. hederaceus* (Ivy-leaved Crowfoot) occurred near William Beck Farm.

The walk to Raisdale Beck offered a variety of habitats, marsh, woodland and streamside. Species found included *Equisetum sylvaticum** (Wood Horsetail), *Prunus padus* (Bird Cherry), *Salix pentandra** (Bay-leaved Willow), *Taraxacum palustre* (Marsh Dandelion), and *Potamogeton natans** (Broad-leaved Pondweed) in a nearby pool.

An additional 36 common species not shown in the *Atlas* for 44/59 were recorded.

Bryophytes (M. Dalby)

For the bryologist the highlight of the visit to Bilsdale was *Mielichhoferia elongata*, a rare British moss having its only English station on the Ingleby Greenhow Moors. This was new to two members of the party and we thank the Forestry Commission for allowing access. It grows on crumbling shale and seems to have exceptional chemical requirements which have been the subject of papers in the *B.B.S. Transactions* and *The Naturalist*. As one gully where I have seen it before appears to have been destroyed by a severe landfall, its station is precarious. The area has been well worked; additional species seen included *Solenostoma sphaerocarpum*, *Dicranella palustris*, *Dichodontion pellucidum*, *Bryum pallens* and *Philonotis fontana*.

Fungi (R. Watling)

Of the fifty species of fungi recorded *Athelia bombacina*, a Basidiomycete growing over lichens on *Quercus*, *Lophiostoma macrostomatiodes* and *Zignoella ovoidea* were of note.

Insects (W. A. Ely)

The heat on Saturday drove many terrestrial insects into the ground but caused others to take to the air and ground-beetles and click-beetles were flying strongly. The dull conditions of Sunday inhibited flight and made ground searches much more rewarding.

Mr. and Mrs. Flint worked the moorland in 45/50 on Saturday and noted 18 species of ground-beetle, including the tiger-beetle *Cicindela campestris* L. which was flying in some numbers. Other insects included the bright blue shield-bug *Zicrona coerulea* (L.), the beetle *Byrrhus fasciatus* Forst., the uncommon bumble-bee *Bombus muscorum* L. and two sawflies not previously reported in V.C. 62, *Rhogogaster chambersi* Benson and *Aneugmenus furstenbergensis* Konow, the latter a scarce bracken-feeding insect only once previously recorded in Yorkshire. Emperor moths (*Saturnia pavonia* L.) were flying freely over the heather and a single Green Hairstreak butterfly (*Callophrys rubi* L.) was seen.

The valley to the south of Chop Gate was visited by the writer on Saturday afternoon and the ground-beetle *Trechus rubens* F., the upland click-beetle *Corymbites cupreus* F. and a good variety of more common species were seen. The gorse shield-bug *Piezodorus lituratus* (F.) was present in some numbers near the village.

The moorland in 44/59 was visited on Sunday. The local moorland ant *Myrmica sulcinodis* Nyl. was noted, and 26 species of ground-beetle were recorded including the large, scarce *Carabus glabratus* Payk. (for its fifth 10 km square in Yorkshire), *Pterostichus adstrictus* Esch. and *Bembidion unicolor* Ch.

Other Arthropods (W. A. Ely)

As woodlice and millipedes are so rarely reported, a full list is given. The woodlice seen were *Oniscus asellus*, *Porcellio scaber*, *Philoscia muscorum* and *Trichoniscus pusillus* (SE59). Two millipedes were present in *Juncus* and *Deschampsia* litter, and *Cylindroiulus punctatus* and *Tachypodoiulus niger* at Urra. *Polydesmus angustus* and *Glomeris marginata* (pill millipede) were recorded at Chop Gate, and along Tripsdale Beck *Proteroiulus fuscus* was in dead trees with *Iulus scandinavius* present on top of the heather rather than underneath it.

LANGSET, V.C.63 — 11th June

Vascular Plants (D. R. Grant)

The party first walked up the main road towards the Flouch Inn and climbed up a hill known as Castle Dyke. The top slopes of the hill were covered with small bushes of *Ulex gallii* (Western Gorse) which will have a glorious show of deep yellow flowers during the autumn months. The field below the hill was virgin pasture and here several colonies of *Ophioglossum vulgatum** (Adder's-tongue) were seen. Alongside the field edges *Salix aurita* (Eared Willow) was an occasional shrub. An old Millstone Grit quarry was visited next where a pool has developed on the quarry floor. Growing in this area were: *Equisetum fluviatile* (Water Horsetail), *Littorella uniflora* (Shoreweed) and *Eleocharis uniglumis** (Slender Spike-rush), the last being an important record for V.C. 63 where it is very rare. Other species found in the 10 km grid square (44/20) were: *Ranunculus omiophyllus** (Round-leaved Crowfoot), *Hydrocotyle vulgaris** (Marsh Pennywort), *Potamogeton polygonifolius** (Bog Pondweed), *Luzula multiflora** (Heath Wood-rush), and the sedges, *Carex demissa**, *C. panicea**, *C. flacca** and *C. echinata**.

After lunch members moved up the River Porter to Fox Clough (44/10). This is a valley running off typical Millstone Grit moorland; there are, however, shales exposed in some places along the valley sides and these give rise to large boggy areas. In these bogs there are a good number of sedges, notably *C. laevigata**, *C. curta**, *C. pulicaris** and a very small colony of *C. paniculata**. In the more stony bogs *Chrysosplenium oppositifolium* (Opposite-leaved Golden-saxifrage) and *Montia fontana* (Blinks) were seen. There were some very fine clumps of *Dryopteris pseudomas* (Scaly Male-fern). The effect of altitude and the lateness of the season were illustrated by the fronds of *Thelypteris limbosperma** (Lemon-scented Fern) only just beginning to unfurl. As a thunderstorm started, a few bushes of *Prunus padus** (Bird Cherry) and a tree of *P. avium** (Gean) were found in the wooded part of the clough.

Species marked * are not recorded in the *Atlas* for the relevant 10 km grid square.

Bryophytes (M. Dalby)
The best find of the day was almost the first specimen gathered, *Grimmia doniana*, collected by Mr. Blockeel from a wall at the entrance to the woods. This moss has not been recorded in V.C. 63 since 1854, but Mr. Blockeel has found it in another station at Walshaw Dean. This may be a sign of decreasing atmospheric pollution for it is a species confined to siliceous rocks. Other saxicolous species found included *Grimmia trichophylla* and *Ptychomitrium polyphyllum*. In the morning a visit to an old quarry in the woods near the reservoir produced *Campylopus introflexus*, a record of interest because this moss is rapidly spreading in V.C. 63 where it was first found only in 1971. Later the Little Don valley beyond the bridge produced a number of *sphagna* species including *S. teres* growing with *Drepanocladus exannulatus* and *Philonotis fontana* in a small flush. Other species present were *S. palustre*, *S. squarrosa*, *S. recurvum*, *S. cuspidatum*, *S. subsecundum var auriculatum* and *S. fimbriatum.*

Fungi (R. Watling)
Forty species of fungi were recorded. *Calocera furcata* at Fox Clough was the only species of real note, although it was very interesting to find *Laetiporus sulphureus* producing a red cubic rot of oaks and *Inonotus hispidus* attacking a large ash at Langsett filter beds.

Insects (W. A. Ely)
The weather was far from ideal for insect collecting and few notable ones were taken. The striking red and black hopper *Cercopis vulnerata* Gmel. was present below the reservoir and the upland click-beetle *Corymbites cupreus* F. was on Castle Dyke. Over three 10 km squares only 18 species of ground-beetle were seen, including *Bembidion geniculatum* Heer by the head of the reservoir and *Amara communis* Pz. on Castle Dyke. Mr. J. Lee, investigating the animal remains in discarded bottles, found corpses of *Carabus violaceus* L., *C. problematicus* Herbst, and the carrion-beetles *Necrophorus investigator* Zett., *N. vespilloides* Herbst and *Thanatophilus rugosus* L. The rove-beetles *Lesteva pubescens* Mann. and *Geodromicus plagiatus* F. were taken by Mr. and Mrs. Flint near the Little Don rivers. The conspicuous crane-flies *Pedicia rivosa* L. and *Tipula maxima* Poda were flying in the woodland below the reservoir in the brief rainless periods in the afternoon, and ladybirds in the conifer plantations included the large *Anatis ocellata* L. (J. Lee). The Green Hairstreak (*Callophrys rubi* L.) in the old quarry north of the reservoir was the only notable butterfly seen.

Other Arthropods (W. A. Ely)
The woodlice seen were *Oniscus asellus* and *Porcellio scaber* on Castle Dyke, and below the reservoir the former species and *Trichoniscus pusillus*.

The millipedes *Tachypodoiulus niger*, *Ophyiulus pilosus* and *Polydesmus gallicus* were on Castle Dyke, *Iulus niger*, *Cylindroiulus punctatus* and *Proteroiulus fuscus* in woodland below the reservoir. *P. gallicus* is a southern species, here at the edge of its range, and this was the first specimen collected in Sheffield.

SEDBURY PARK, V.C. 65 26th June

Vascular Plants (J. E. Duncan)
The visit to the grounds of the two estates gave opportunity to investigate new areas and a number of different habitats: parkland, ponds, woodland, pathsides and gardens, resulting in a list of over twenty species not recorded in the *Atlas* for the 10 km grid square 45/10 and indicated below by an asterisk.

In Sedbury Park two ponds proved of interest. The vegetation round the first included *Equisetum palustre** (Marsh Horsetail), *Iris pseudacorus* (Yellow Iris), *Typha latifolia** (Reedmace), *Carex hirta* (Hairy Sedge) and *C. ovalis* (Oval Sedge). In the water were the pondweeds *Potamogeton crispus* and *P. natans**, and near the edge *Lemna trisulca** (Ivy-leaved Duckweed). Round the second pond was a thick growth of *Carex acutiformis** (Lesser Pond-sedge).

A good spread of *Doronicum pardalianches* (Leopard's-bane) was seen in the woods; typical species here included *Carex sylvatica* (Wood-sedge), *Poa nemoralis** (Wood Poa) and *Melica uniflora* (Wood Melick). Two ferns were of interest beside a stream in the wood: *Gymnocarpium dryopteris** (Oak Fern) and the decumbent form of *Blechnum spicant* (Hard Fern). Small ferns on the wall were: *Asplenium trichomanes* (Maidenhair Spleenwort), *A. ruta-muraria* (Wall-rue) and *Polypodium vulgare* (Polypody).

The walls of the track beside the grounds of Hartforth Hall were rich in species, the most notable being *Draba muralis* (Wall Whitlowgrass). Within the grounds, pathsides, disused gardens and grassland provided a wealth of species including *Erinus alpinus** (Fairy Foxglove), *Valerianella locusta** (Common Cornsalad) and *Poa compressa* (Flattened Poa). In the woodland were *Symphytum tuberosum** (Tuberous Comfrey) and about a dozen spikes of *Epipactis helleborine* (Broad-leaved Helleborine).

Sixteen relatively common species were added to the *Atlas* records for 45/10.

Bryophytes (M. Dalby)
Sedbury Park was visited in the morning and a number of fairly common species noted for a previously underworked square. The various habitats within the grounds included a small stream where *Hygroamblystegium tenax*, *Dichodontium pellucidum* and *Eurhynchium riparioides* grew on boulders. Hartforth Hall in the afternoon proved more profitable as far as the bryophytes were concerned. It was unfortunate that the stream had been very thoroughly "cleaned", for the remnants of riverside plants were interesting. *Hygroamblystegium tenax*, *Tortula latifolia* and *Barbula spadicea* were found there in depauperate condition on old willow roots and detritus. *Orthotrichum affine* occurred together with *Metzgeria furcata* on an ash tree in the grounds. Roadside walls produced such species as *Grimmia pulvinata*, *C. apocarpa*, *Barbula rigidula* and *Bryum inclinatum* and, as usual, *Campylopus introflexus* was found.

Fungi (R. Watling)
Forty-six fungi in all were collected, of which seven species were agarics including *Calocybe gambosum*, 'St. George's mushroom'; of particular interest was *Coprinus megaspermus* from Sedbury Hall and *Inonotus dryadeus* on an old oak at Hartforth. *Calocera furcata* was present in great profusion. Choke-grass, *Epichloë typhina*, was found attacking *Holcus* at Sedbury, and *Pycnostysanus azalae* devastating buds of *Rhododendron* at Hartforth.

Lepidoptera (J. Payne)
In spite of the day's lack of promise the following butterflies were found or reported, Orange Tip ♂, Wall ♂, Small Heath and Small Copper. The Chimney Sweeper, Silver-Ground Carpet and Common Carpet Moths all appeared to be comon. One Brimstone Moth was seen and a Muslin Moth ♀, *Cycnia mendica* Clerck, was found dead. Larvae of the micro *Simaethis fabricana*, Linn., were taken on nettle and bred out, and the brown micro *Acleris rhombana* Schiff. was also taken.

Insects (J. Payne)
Seven-spot Ladybirds were common and Bumble Bees were working a rhododendron hedge. A queen Wasp was seen. As the party left Hartforth Hall in a rain shower several May Flies known as Black Drakes, *Ephemera danica*, were flying over the drive.

GOODMANHAM, V.C. 61 2nd–34d July

Vascular Plants (E. Crackles)
On Saturday the botanists worked along the disused railway line from Goodmanham to Enthorpe station. Large stands of *Cicerbita macrophylla* (Blue Sowthistle) were noted in the village. Along the railway track, the most characteristic species were: *Cerastium glomeratum* (Sticky Mouse-ear Chickweed), *C. semidecandrum* (Little Mouse-ear Chickweed), *Sagina apetala* (Annual Pearlwort), *Arenaria serpyllifolia* (Thyme-leaved Sandwort), *Sedum acre*

(Stonecrop), *Chaenorhinum minus* (Lesser Toadflax), *Catapodium rigidum* (Fern Grass), *Aira praecox* (Early Hair-grass) and *A. caryophyllea* (Silver Hair-grass). Other species noted along the track included: *Erophila verna* (Whitlow Grass), *Senecio viscosus* (Sticky Groundsel) and *Vulpia bromoides* (Squirrel-tail Fescue). *Centranthus ruber* (Red Valerian) in various shades of red and pink, and occasionally white, made a fine show and was particularly abundant along the line near Enthorpe station. A form of *Geranium molle* (Dove's-foot Cranesbill) with smooth fruits occurred in some quantity along the track.

The railway banks were particularly notable for their rich array of calcicoles. These included: *Arabidopsis thaliana* (Thale Cress), *Reseda lutea* (Mignonette), *Hypericum perforatum* (Common St. John's-wort), *Silene vulgaris* (Bladder Campion), *Linum catharticum* (Fairy Flax), *Trifolium campestre* (Hop Trefoil), *Anthyllis vulneraria* (Kidney Vetch), *Aphanes arvensis* (Parsley Piert), *Pimpinella saxifraga* (Burnet Saxifrage), *Clinopodium vulgare* (Wild Basil), *Galeopsis angustifolia* (Narrow-leaved Hemp-nettle), *Plantago media* (Hoary Plantain), *Knautia arvensis* (Field Scabious), *Centaurea scabiosa* (Greater Knapweed), *Leontodon hispidus* (Rough Hawkbit), *Hieracium pilosella* (Mouse-ear Hawkweed) and *Trisetum flavescens* (Yellow Oat). Other species occurring along the banks included *Vicia hirsuta* (Hairy Tare) and *Brachypodium sylvaticum* (Slender False-brome). *Ophrys apifera* (Bee Orchid) and *Anacamptis pyramidalis* (Pyramidal Orchid) in some quantity occurred locally near Ashslack Wood, on the railway bank, in nearby clearings or along a wood ride, whilst *Hypericum hirsutum* (Hairy St. John's Wort), *Campanula glomerata* (Clustered Bellfower) and *C. rotundifolia* (Harebell) were also present.

Species noted in arable fields adjacent to the track included: *Papaver rhoeas* (Field Poppy), *Torilis nodosa* (Knotted Hedge-parsley), *Euphorbia helioscopia* (Sun Spurge), *E. exigua* (Dwarf Spurge), *Anagallis arvensis* (Scarlet Pimpernel) and *Legousia hybrida* (Venus's-looking-glass).

On Sunday, useful work was done in Londesborough Park, although the area was somewhat disappointing on account of the low representation of the few interesting species.

By the lake were large beds of *Glyceria maxima* (Reed-grass) with considerable local beds of *Carex riparia* (Greater Pond-sedge). The species seen most frequently in the marshy ground here, at least locally, were *Conium maculatum* (Hemlock) and *Rumex sanguineus* (Wood Dock). Other marsh species noted were *Equisetum palustre* (Marsh Horsetail), *Lychnis flos-cuculi* (Ragged Robin), *Stellaria alsine* (Bog Stitchwort), *Filipendula ulmaria* (Meadow Sweet), *Epilobium hirsutum* (Great Hairy Willow-herb), *E. obscurum* (Short-fruited Willow-herb), *Myosotis caespitosa* (Tufted Forget-me-not), *Veronica beccabunga* (Brooklime), *Mentha aquatica* (Water Mint), *Cirsium palustre* (Marsh Thistle), *Juncus inflexus* (Hard Rush), *Sparganium erectum* (Bur-reed), *Typha latifolia* (Bulrush), *Carex acutiformis* (Lesser Pond Sedge), *C. hirta* (Hairy Sedge) and *C. spicata* (Spiked Sedge). *Petasites hybridus* (Butterbur) occurred locally here.

In wooded areas by the lake *Cardamine flexuosa* (Wood Bitter-cress) and *Dryopteris dilatata* (Broad Buckler-fern) were particularly frequent. Other species in this habitat were *Dryopteris filix-mas* (Male Fern), *D. carthusiana* (Narrow Buckler-fern), *Moehringia trinervia* (Three-nerved Sandwort), *Geum rivale* (Water Avens), *Circaea lutetiana* (Enchanter's Nightshade), *Chaerophyllum temulentum* (Rough Chervil) *Aegopodium podagraria* (Ground Elder), *Mercurialis perennis* (Dog's Mercury), *Campanula latifolia* (Giant Bellflower), *Arum maculatum* (Wild Arum), *Festuca gigantea* (Giant Fescue), *Poa trivialis* (rough Meadow-grass) and *Bromus ramosus* (Hairy Brome).

Apium nodiflorum (Fool's Watercress) was abundant in two dykes with *Equisetum telmateia* (Great Horsetail) dominant over a short stretch of one of them.

The disused Shiptonthorpe railway was then examined. Many of the species met with at Goodmanham occurred along the track, but calcicolous plants were scarce. *Chrysanthemum leucanthemum* (Ox-eye Daisy) was particularly abundant. Other noteworthy species were *Aquilegia vulgaris* (Columbine), *Potentilla anglica* (Trailing Tormentil), *Epilobium adenocaulon* (American Willow-herb), *Scrophularia aquatica* (Water Figwort), *Veronica serpyllifolia* (Thyme-leaved Speedwell), *Phragmites communis* (Common Reed) and *Alopecurus geniculatus* (Marsh Foxtail).

Lepidoptera (J. Payne)
Butterflies seen or reported were the Large White, Small White, Orange Tip (plentiful), Common Blue ♂, Small Heath ♂ ♀, and a few Large Skippers along the old railway track near Goodmanham on the Saturday. On the Sunday the Meadow Brown was noted near a chalk bank. A Silver-ground Carpet and The Shears, *Hada nana*, were taken on the railway and a single Cinnabar in Londesborough Park.

Grass Moths were common in the parkland and the yellow micro *Xanthosetia hamana* was seen. In spite of suitable weather there was no great number of butterflies and moths where the land was farmed, owing, it was thought, to the prevalence of aerial spraying.

Other Insects (J. H. Flint)
Although the weather was fine for insect collecting, the results were generally poor. This was particularly noticeable in Londesborough Park where insect life was scarce on the pastures and almost equally so on the margins of the woodlands. The insects seen consisted almost entirely of very common species of general distribution, and it is tempting to relate this paucity to agricultural practices. In the hot sunshine damsel-flies were expected to be plentiful by the lake but only a few *Ischnura elegans* Lind. and a couple of *Enallagma cyathigerum* Charp. rewarded a careful search.

The one notable insect discovery was made by Mr. Bernard Nau who found a single example of the bug *Ischnodema sabuleti* Fall. New to the vice-county, its discovery here represents quite a singificant northward extension of its range. It was first discovered in Yorkshire at Potteric Carr in 1971, which marked a very considerable northward extension of its range because until recent years it was rare and restricted to the south-east of England. Once established, its numbers apparently explode and it seems likely that it will spread, at least to much of lowland Yorkshire.

CARLTON, V.C. 64 — 16th July
Vascular Plants (J. R. Hickson)
As a result of preliminary visits to the area during the previous twelve months and of the meeting itself, about 50 additional species have been added to the list of known plants for the 10 km grid square 44/62.

In general the area does not appear to have a very rich native flora and the less common plants are well scattered in ponds, dikes, woods, lane-sides, field margins and marshy places etc. As only a limited number of these could be visited during the day, most members concentrated their activities on Carlton Park in the morning and the disused railway lines at Drax in the afternoon.

At Carlton Park the lakeside area provided the greatest diversity of plant life, although even here the number of species noted was not very large. *Nuphar lutea* (Yellow Water-lily) was abundant on the lake and *Ceratophyllum demersum* (Rigid Hornwort) was plentiful in the water around the edges. *Rumex maritimus* (Golden Dock) was seen growing on the southern margin and *Rorippa amphbia* (Great Yellow-cress) made an attractive show in a few places here. The predominant vegetation around the lake was *Glyceria maxima* (Reed Sweet-grass) with large areas of *Iris pseudacorus* (Yellow Iris) and *Typha latifolia* (Bulrush). *Ranunculus sceleratus* (Celery-leaved Buttercup), *Polygonum amphibium* (Amphibious Bistort), *P. lapathifolium* (Pale Persicaria), *Lycopus europaeus* (Gipsywort) and *Bidens cernua* (Nodding Bur-marigold) were also present. Innroduced trees in the woodland included good specimens of *Acer platanoides* (Norway Maple), *Castanea sativa* (Sweet Chestnut) and *Quercus cerris* (Turkey Oak), and in the shrub layer some rather poor specimens of what appeared to be *Ribes alpinum* (Mountain Currant) and *Euonymus europaeus* (Spindle) were seen. A few plants of *Epipactis helleborine* (Broad-leaved Helleborine) were found by Mr. Chicken in a woodland clearing.

The disused railway track and embankment at Drax proved to be the most rewarding area visited in terms of variety of species seen and also of quantity of plants in flower. The track itself provided a good habitat for such species as *Reseda lutea* (Wild Mignonette), *Melilotus officinalis* (Ribbed Melilot), *Trifolium arvense* (Hare's-foot Clover), *Anthyllis vulneraria*

(Kidney Vetch), *Centaurium erythraea* (Common Centaury), *Myosotis ramosissima* (Early Forget-me-not), *Chaenorhinum minus* (Small Toadflax), *Vulpia bromoides* (Squirreltail Fescue), *V. myuros* (Rat's-tail Fescue), *Aira praecox* (Early Hair-grass) and *A. caryophyllea* (Silver Hair-grass). On or beside the embankment more notable species included *Agrimonia procera* (Fragrant Agrimony), *Pimpinella major* (Greater Burnet-saxifrage), *Knautia arvensis* (Field Scabious), *Dipsacus fullonum* (Teasel), *Senecio erucifolius* (Hoary Ragwort), *Pulicaria dysenterica* (Common Fleabane), a nice colony of *Ophrys apifera* (Bee Orchid) and a good patch of what was thought to be *Lathyrus tuberosus* (Tuberous Pea), known to have flourished here for at least 20 years. At the Newland end of the embankment *Vicia tetrasperma* (Smooth Tare) was seen and reported, as was *Amsinkia intermedia*, an alien seen at the edge of a cornfield and probably introduced with fertilizer.

There was no sign of *Stratiotes aloides* (Water-soldier) in the water-filled cutting at Brock Holes, where it was well established a few years ago. One of the few uncommon species noted here was *Lysimachia nummularia* (Creeping Jenny). Mr. Grant produced an alien water weed from a dike at Little Airmyn, which has been determined by Dr. F. H. Perring as *Elodea nuttallii*.

Bryophytes (M. Dalby)

Conditions were very dry for the bryophytes especially along the old railway line, but around the woodland and lake of Carlton Towers a number of habitats were found and the species-list of another underworked square was improved. *Fissidens viridulus var tenuifolius* was growing abundantly over a piece of fallen statuary in the woods and it was interesting to find *Campylopus introflexus* yet again, this time in an unusual habitat covering an old log fallen near the lake. The mud at the lakeside produced *Bryum rubens*, *Pseudophemerum nitidum* and *Physcomitrella patens*. In the afternoon at Brockholes *Leptodictyum riparium* grew in abundance over the willow roots and submerged in the water. *Fontinalis antipyretica* was also present. A wet patch of clay yielded *Acrocladium cuspidatum*. *Barbula fallax* and *Riccardia sinuata*, and the old railway line produced records of *Cirriphyllum piluliferum*, *Polytrichum juniperinum* and *P. piluliferum*. A small patch of *Barbula tophacea* was found.

Lepidoptera (J. Payne)

The following butterflies were seen or reported, The Small White, Common Blue, Ringlet, Small Skipper and a large fritillary with the Meadow Brown, Large Skipper and Small Heath plentiful. A Mullein Moth larva was swept from figwort. The Silver Y, Blood Vein, Brimstone Moth, Burnet Companion, Yellow Shell, Shaded Broad-bar, Clouded Border and the Nutmeg were noted. Only a single 5-Spot Burnet was noted although trefoils, vetches and clovers on which it feeds were abundant.

The China Mark, *Nymphula nympheata*. L., was was taken in fair numbers. A "flight" of the longhorn moth *Nemotois degéerella* (L.), was seen beneath a grove of mature trees near the lake and specimens were taken. J. Flint took a Veneer Moth and a small grass moth was present in fair numbers.

Insects (J. H. Flint)

The immediate environs of the lake, particularly the north bank, were productive of insects, and indications are that this is a habitat of considerable interest to entomologists. A high wind interfered with collecting, but many insects were active in those parts sheltered by the trees. There was an abundance of the two damsel-flies *Ischnura elegans* Lind. and *Enallagma cyathigerum* Charp. and with two early examples of *Sympetrum striolatum* Charp. on the wing it appears that the lake may well hold a significant dragonfly population, a welcome prospect as suitable habitats for these insects dwindle. The exposed mud of the marshy margins on the north bank held strong colonies of the rove-beetle, *Platystethus cornutus* Grav., and of *Heterocerus fenestratus* Thunb. One example of *Dyschirius luedersi* Wagn. was seen; *Platystethus* is its probable prey here. Other local marsh insects included the hoverfly *Eristalis sepulchralis* L., the bug *Polymerus nigritus* Fall. and the beetle *Scirtes hemisphaericus* L. Mr. Payne's discovery of a strong colony of the bug *Ischnodema sabuleti*

Fall. was further evidence of the continuing northward spread of this insect and was the morning's most notable find.

Other insect species included the slender robber-fly *Leptogaster cylindrica* Deg., on grey poplar *(Populus canescens)* an abundance of the bug *Sthenarus rotermundi* Scholtz and a single example of the beetle *Zeugophora subspinosa* F., on old ivy a single *Ochina ptinoides* Marsh., the bug *Heterocordylus tibialis* Hahn in plenty on broom, a single *Hygrotus impressopunctatus* Schall. taken by Dr. Lloyd-Evans in a muddy cattle pond and the longhorn moth *Adela degeerella* L.

By contrast, the afternoon visit to the railway line south of Drax was productive only of common insects.

BOOK REVIEWS

The Forest Dwellers by **Stella Brewer**. Pp. 254 + 16 monochrome plates. Collins, 1978. £5.75.

Possibly because of their evolutionary proximity to man chimpanzees (as well as other apes) attract our sympathy and interest in a way that no other animals do. Miss Brewer's involvement with chimpanzees resulted from the trade in young animals in Sierra Leone. Her book is essentially an account of her attempts to rehabilitate chimpanzees obtained initially from a local market and later as her work progressed from other locations including two animals that had lived for a short time in London Zoo. Initially her rehabilitation centre was a small nature reserve in Sierra Leone but as this location was found to have a number of shortcomings she subsequently moved to the Niokola National Park in Senegal. Here she set up camp and lived with the chimpanzees for several years.

Clearly, Miss Brewer applied herself with great dedication to her difficult task. The dehumanising of these animals proved much less easy than the layman may expect and in the process of achieving (or partially achieving) this the author developed a very close relationship with and understanding of her charges. Her descriptions of the behavioural relationships and interactions of chimpanzees are extremely revealing and reflect the intimate understanding and affinity she has towards them. She writes well, subtly providing the reader with a variety of good narrative, pathos and humour. At the same time her naivety and immaturity emerge in response to certain events she encountered such as the death of the baby elephant and the consumption of monkeys by the chimpanzees. But this is nevertheless sound, popular, readable natural history.

The author has had a unique opportunity to record a considerable amount of "hard" biological information on these semi-wild chimpanzees such as growth rates, maturation characters, ethological parameters, sexual cycles, etc. These do not appear in this book (they could for example have been included in appendices). It is to be hoped they do not go unpublished.

M.J.D.

Production Ecology of Ants and Termites edited by **M. V. Brian.** Pp. xvii + 409. Cambridge University Press, Cambridge. 1978. £19.50.

This 13th member in the International Biological Programme series is, like all but one of its companion volumes, multi-authored. As usual this leads to some oddities such as the continuous use of the incomprehensible word 'biotope' by the central Europeans, 'biocoenose' by the east Europeans and 'ecosystem' by the rest.

The principal message which emerges from the book is the difficulty of studying the ecology of these insects in the field. It is impossible to prescribe a single method for the estimation of population density, for example, when some species live in hidden underground nests, others build mounds, others live hidden in the aboveground parts of plants and yet others build nests externally attached to the plant. Even digging up an obvious termite mound in an attempt to count its inhabitants is fraught with problems, as an unknown number always escape along subterranean passages during the excavation.

Some fascinating snippets of natural history are to be found amongst the mass of data,

such as the Australian Pine which is protected from the destructive attentions of the termite *Nasutitermes exitiosus* because the oils in its timber contain chemicals which are the dominant constituent of the termites' alarm pheromone! There is the strange account of an experiment to determine the respiration rate of termites by measuring the oxygen consumption of a nest full of animals. The animals were then removed from the nest and counted. Just to obtain a base-line, the bits of nest were returned to the apparatus and their oxygen consumption measured. To the surprise and dismay of the workers the oxygen consumption of the empty nest was greater than that of the nest full of termites! The fungi which live (and are cultured by the termites) in and on the walls of the nest had their respiration stimulated by the aeration brought about by breaking up the walls.

An odd point from the quantitative point of view is the extent to which workers in different fields are worried about different orders of magnitude of error. The energeticists are concerned over 7% differences in oxygen consumption between the use of glucose or palmitic acid as substrate while the population ecologists encounter differences of several 100% in their density estimates. Since both numbers appear in the final sums for energy flow per unit area it seems positively finicking to worry about the respiration problems until much better methods of estimating population density are available.

The book is fairly heavy going if read from front to back but then I doubt if anyone other than a reviewer would do this. As a reference to the literature and to the new data generated by IBP it will be extremely useful to ant and termite specialists. The claim on the sleeve that the book contains valuable information for the general ecologist is not borne out by close inspection. Naturalists will not be buying this book.

M.J.C.

Looking at Butterflies by **L. Hugh Newman.** Pp. 144, 16 coloured plates, 16 pages distribution maps. Collins, 1977. £3.95.

The original edition of this book was published in 1959 at 8/6d, and as a pocket guide, was perhaps the most useful among many other butterfly books by an author not always to be taken too seriously. Even here, however, a number of inaccuracies were present, especially in distribution. Although much condensed, the present edition, completely recast and edited by Geo. E. Hyde, is now a wholly reliable and accurate guide. The 64 distribution figures are a useful addition. The reproductions of some of Mr. Hyde's wonderful photographic work are included on the jacket: it is a pity the opportunity was not taken to replace the old badly laid out, poor colour plates with work of equal excellence by contemporary artists.

The book will appeal to the country lover or beginner rather than the dedicated entomologist and as such will fill a useful role: it will be among the best of the present field guides to slip into the pocket. The edition is well produced on fine paper and by today's standards, not over-priced.

C.R.H.

Frederick William Frohawk by **Valezina Bolingbroke.** Pp. 16, with 3 monochrome plates. E. W. Classey. 1977. £1.00 (limp covers), post free from: E. W. Classey Ltd., Park Road, Faringdon, Oxon. SN7 7DR.

Very much the sentimental souvenir: a charming, if rather superficial, 9-minute read — his daughter's tribute to the naturalist, F. W. Frowhawk (1861–1946), best remembered for his 2-volume work, *The Natural History of British Butterflies.*

Cruickshank's Photographs of Birds of America by **A. D. Cruickshank.** Pp. 182. Dover Publications Inc., New York. 1977. £4.25.

A collection of 177 superb black and white photographs, linked by brief but evocative text. Colour would have been redundant in most of these photographs, which apart from their beauty reveal many interesting points about bird and flight. A well-produced American soft-back, selling for $6.00 in the U.S. but regrettably overpriced in Britain.

B.S.

British Anascan Bryozoans by **J. S. Ryland** and **P. J. Hayward.** Pp. 188, with 85 figures. Synopses of the British Fauna (New Series) No. 10, Linnean Society of London and Academic Press. 1977. £3.90, limp covers.

Marine biologists will welcome this important identification guide which provides valuable keys to the suborder Anasca of the Cheilostomata. Detailed taxonomic descriptions with illustrations, and notes on the ecology and distribution, of the major species are provided in the main body of the text which is preceded by information of general structure, ecology, methodology, etc. and followed by a glossary, references and an index.

The Rain Forests of Golfo Dulce by **Paul H. Allen.** Pp. xvii + 417, including 34 plates and 25 line drawings. Stanford University Press. 1977. $25.00.

This is a re-issue of the 1956 edition of Allen's valuable contribution to our knowledge of lowland tropical rain forests in Latin America, especially Costa Rica. The present work has a new foreword by Peter H. Raven which includes biographical information on and an appreciation of Paul Hamilton Allen who died in 1963. The book contains physiographical and ecological data, detailed keys, an alphabetical index to the families, genera, species and common names (with extensive taxonomic notes), utilization lists, and a glossary.

Geographic Variation, Speciation, and Clines by **John A. Endler.** Pp. ix + 246. Monographs in Population Biology 10, Princeton U.P., 1977. £12; £4.54 paperback.

The preface to Endler's book describes it as an exploration of the factors that lead to development of geographic variation among species . . . through the study of clines, or geographic character gradients (Huxley, 1939).

The book contains six chapters, and a most necessary glossary of the symbols used in the mathematical modelling, which takes-up the greater part of the book, and of the terminology used. Each chapter carries a summary of the main conclusions; for those concerned more with principles than with "proofs" these summaries provide the main interest in the book.

Ecologists, taxonomists and systematists all encounter problems resulting from morphological gradation; few will be able to read Endler's entire text with comprehension, although readers with a considerable knowledge of mathematics may find the derivation of models and manipulation of symbols less daunting than the rest of us.

The book will be of little use to undergraduates on biology courses. It will be of more use to their teachers who require conceptual material with a sound theoretical backing to use in courses involving reference to the subjects of the title.

D.J.H.

The Observer's Book of Fossils by **R. M. Black.** Pp. 191, with 135 line drawings and 16 black and white photographs. Frederick Warne, London. 1977. £1.10.

This book is an excellent addition to the Observer Series. It is a very sound introduction to the diverse field of palaeontology and is amply illustrated with drawings and photographs.

The first section explains what fossils are, how and why they occur, and gives details of biological classification, geological time, environments, rock types, early forms of life, evolution, adaption and extinction. The last two pages of this section explain how and where to collect fossils, how to clean and identify them, what equipment is needed for collecting and a code of practice for collectors. The main part of the book is devoted to describing the major fossil groups, with general information on each group and detailed examples of a few carefully chosen genera within these groups. As one would expect, the largest part of this section deals with invertebrate groups, but there are also shorter sections on vertebrate groups and plants.

P.M.E.-B.

Let's Collect Fossils by **A. Mathieson.** Pp. 36, with colour photographs. Jarrold Collectors Series, 1977. 40p.

This little booklet is certain to whet the appetite of anyone wanting to learn about fossils for the first time. It is illustrated with fine colour photographs as one would expect of a Jarrold Colour Publication.

The booklet consists of a brief introduction explaining what fossils are and where and how to collect and identify them. This is followed by a well-chosen selection of fossils covering most groups and most geological periods. For each fossil there is a colour photograph together with a short text of descriptive and otherwise interesting information. At the end of the book is a fossil collectors code which is a very worthwhile addition. Inside the front cover are details of a fossil collectors kit together with the geological time-scale.

Let's Collect Fossils is an easy-to-read booklet which should inspire most newcomers to delve further into the world of fossils.

P.M.E.-B.

Fenland: Its Ancient Past and Uncertain Future by **Sir Harry Godwin.** Pp. 196, with 65 black and white plates, and 45 figs. Cambridge U.P. 1978. £7.95.

This book provides a fascinating insight into the topography, archaeology, history and biology of a large area of Britain which has been greatly influenced by man's activities for many centuries. Sir Harry Godwin is the foremost authority on the subject: the text and supporting illustrations are a reflection of a life-time's attention to field and laboratory detail and an interdisciplinary approach to the numerous scientific and non-scientific subjects to be covered in such an in-depth study.

All naturalists will find something to their liking in this compendium of knowledge which has been derived for the most part from first-hand experience.

M.R.D.S.

Self-sufficiency by **John** and **Sally Seymour.** Pp. 250, with 12 illustrations. Faber Paperbacks. 1977. £1.50.

Though John Seymour confesses to a measured envy of Thoreau at his diet of beans and dreams in his Walden retreat, he is no back-to-nature freak. He and his wife have turned out a practically-minded manual for anyone seeking more freedom from "them" and "their" control of our days and ways. Land, livestock, foodstuffs, fodder, herbs, spices, fruit, nuts, beer and seaweed, all these and more are competently surveyed, with a larding of first-hand hints and comments. A recipe for sea-holly instead of asparagus, however, remains (understandably?) untried by the authors. If the book neglects the arty-crafty, no matter. That branch of do-it-yourself already has its own extensive literature.

The book's backcloth theme is irreproachable. "The good husbandman is not the tyrant of his piece of land, but should be the benign controller — and *part of the biosphere himself*". Sally Seymour's illustrations enjoyably enrich a text with such a premiss. The shade of William Cobbett, whose "Cottage Economy" provides over half the chapter-epigraphs (Thoreau, Shakespeare and God are called on for but one contribution each), must be smiling benignly on the authors. The Seymours keep only excellent ghosts.

A.H.

The Countryside Explained by **John Seymour**, with illustrations by **Sally Seymour.** Pp. 223. Faber & Faber, 1977. £4.95.

John Seymour will already be well known to many readers as the author of four excellent books in Collins 'Companion Guide' series. In this new book, his aim is to interpret the modern countryside to the town-dweller, prompted by the current concern for conservation and widespread revival of interest in country matters generally. There are chapters on such topics as farming in general, buildings, crops, domestic and wild animals, plants and transport, with a final chapter on the probable future of our countryside, all attractively illustrated by Sally Seymour's accurately observed and decorative woodcuts. The modern countryside and its practices are set in the historical context from which they evolved, and the book is full of illuminating sidelights on past and present. John Seymour's easy, informal style makes for highly enjoyable reading.

V.A.H.

SHORTER REVIEWS

Golden Bats and Pink Pigeons by **G. Durrell.** Pp. 160, with line drawings. Collins. 1977. £3.50.

Durrell enthusiasts will need no prompting; another cheerful, brief and highly readable account of a naturalists travels — this time to Mauritius and Rodrigues in search of animals for conservation.

Wild Deer in Britain by **R. E. Chaplin.** Pp. 32, including 41 colour plates. Jarrold, Norwich. 1977. 40p.

This recent addition to the Jarrold Nature Series is a useful, authoritative and well illustrated introductory guide to British deer. The numerous colour photographs are of commendable quality.

David Stephen's Guide to Watching Wildlife. Pp. 256, with black and white photographs. Collins. 1977. £1.75.

Third impression of a deservedly popular book first published in 1963. A good, practical first guide for bird and mammal watching in Britain.

Birds of the Coast, Book 2 with text by **Reg Jones**. Pp. 32, with 30 colour photographs. Jarrold Colour Publications. Norwich. 1977. 40p.

Insects in Britain, Books 3 and 4 by **George E. Hyde.** Each pp. 32, with 40 colour photographs. Jarrold Colour Publications. Norwich. 1977. 40p eaheach.

Three more booklets in this deservedly popular Nature Series extend Jarrold's coverage of our bird and insect life. The basic recipe is rightly unchanged and the photography, as ever, is "cooked with love".

The Countryside of the Yorkshire Dales by **Norman Duerden,**
The Countryside of the New Forest by **Heather Angel,**
The Countryside of Lakeland by **Norman Duerden,** and
The Countryside of South Wales by **Heather Angel.** Jarrold, Norwich. 1977.

Further titles in the consistently-excellent Jarrold Colour Publications, each containing 64 pages and costing 80p.

British Sipunculans by **P. E. Gibbs.** Pp. 35, with 13 figures numerous of line drawings. Linnean Society/Academic Press. 1977. £1.80.

No. 12 in the most useful series of Synopses of the British Fauna, providing detailed keys and notes for the identification of the species of this interesting phylum of marine invertebrates.

The World of a Hedge by **Terry Jennings.** Pp. 132, with 23 black and white plates, and 26 line drawings. Faber & Faber. 1978. £3.50.

An interesting account of how hedges have developed, the role they play in the British landscape, and how the lives of the plants and animals they contain interact with each other. Important sections are are also devoted to the future of hedgerows and studying a hedgerow.

Orielton: the Human and Natural History of a Welsh Manor by **Ronald Lockley,** and illustrated by C. F. Tunnicliffe. Pp. 332. Deutsch. 1977. £5.95.

A readable but expensive account of how the author acquired the neglected Pembrokeshire manor of Orielton with 260 acres of land, and, with the support of the Nature Conservancy Council, turned it into a nature reserve. Close observation of the habits of the estate's wildlife — notably owls, bats, badgers and rabbits — will be of interest to amateur naturalists.

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PUBLISHED BY

THE YORKSHIRE NATURALISTS' UNION

THE LEPIDOPTERA OF YORKSHIRE

Separates of the collected instalments which appeared serially in *The Naturalist* (1967-1970) are available from Dr. W. A. Sledge, Department of Plant Sciences, University of Leeds, Leeds 2. Price 50p plus 9p postage.

Also "The Macro-lepidoptera of Spurn Head, E. Yorkshire" by S. L. Sutton and B. R. Spence (ex *The Naturalist*, 1974); price 25p plus 9p postage.

Y.N.U. NEWSLETTER

The Y.N.U. Newsletter, sent to all Full members and Affiliated Societies, is published twice a year: May and September. Its aim is to provide a means of intercommunication between all members by giving, for example, reports on Y.N.U. and Society meetings and activities, items of broad Natural History interest, details of types of surveys and enquiries. All items should be sent to the Newsletter Editor: Mr. H. T. James, 238 Sigston Road, Beverley, Yorks.

LECTURING SERVICE

The Yorkshire Naturalists' Union maintains a list of speakers willing to lecture on a variety of natural history subjects. Secretaries of Affiliated Societies and similar bodies should apply to the Administrative Office, Mr. D. Bramley, c/o Doncaster Museum, Chequer Road, Doncaster DN1 2AE for further details of this service.

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WILDLIFE HABITATS ON NATIONAL TRUST PROPERTIES IN THE YORKSHIRE REGION

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INTRODUCTION

Concern for the effect on the countryside of industrialization led to the establishment in 1895 of the National Trust for Places of Historic Interest or Natural Beauty. It was set up as a charity supported and controlled by its members to acquire, on behalf of the Nation, both land and buildings worthy of permanent preservation. The National Trust, as it is now commonly called, is often associated only with the acquisition of historic buildings, but it owns 152,570ha of land in England, Wales and Northern Ireland. It has also accepted covenants to protect a further 24,690ha against development.

The Trust is not only a major landowner, but has the power to declare its lands inalienable: that is they cannot be sold, mortgaged or compulsorily acquired without the special will of Parliament. It is this unique combination of features which enables it to play an important role in the preservation of the countryside. Its aim in acquiring areas of natural beauty has already helped to safeguard the character of the countryside; it has the potential to do more to conserve wildlife. The growing recognition of this fact has led to a survey of the Trust's properties in order to assess their importance for the conservation of wildlife. To test the feasibility of such a scheme the British Ecological Society organised pilot surveys in Yorkshire, Kent and Norfolk during 1976 and 1977.

Of the 25 properties in Yorkshire, 20 were considered to have relatively "wild" land: this is defined as ground which is not solely covered by buildings or formal gardens. Properties falling into this category are shown on the map in Fig. 1. They cover a total of approximately 6254 ha and range in size from the 3 ha shale promontory of Saltwick Nab near Whitby, and the 3 ha grounds of Nunnington Hall, to about 2301 ha of moorland at Marsden Moor in the Pennines. The characters of the properties are very diverse: in Bransdale a whole rural North Yorkshire valley is protected; the weathered rock formations of Brimham and the Bridestones are well-known; at Malham the Great Scar Limestone supports areas of international importance for their fauna and flora; the historical houses of Nunnington, Ormesby, Beningbrough and Nostell also have attractive grounds which visitors can enjoy:

SURVEY METHODS

In general the Yorkshire properties were poorly documented, and so the most important aspect of the work was field observation. The approach to surveying was of necessity subjective: since the properties represent a wide range of habitats — limestone grassland, cotton-grass moorland, coastal cliffs, deciduous woodland, etc. — no uniform criteria were found on which to base an assessment. The survey was therefore carried out in five distinct stages:

(i) Gaining as much information about the site as possible from the local office of the National Trust.

(ii) Visiting the site, walking over the majority of it, viewing through binoculars any small areas not visited.

(iii) Talking to any people interested in that particular site.

(iv) Collecting whatever material was available in *The Naturalist*, from local Natural History Societies, the Nature Conservancy Council, geological maps, the West Yorkshire Biological Data Bank, etc.

(v) Checking the distribution of scarce species on the Botanical Society of the British Isles distribution maps (Perring and Walters, 1962), and checking site observations with the Nature Conservation Review (Ratcliffe, 1977), etc.

Inevitably such a survey relied extremely heavily on plant communities which are easily and reliably observed (Bunce and Shaw, 1973), almost taking it for granted that an interesting collection of plants implies an interesting collection of animals (Elton and Miller, 1954). Thus vegetation types were noted and approximately delimited on 1:10560 maps during a walk around the property. Notes were also made of birds, but data on insects, spiders, fish, reptiles, amphibians and mammals were largely gained from published records and those with local knowledge of the site.

The report on the properties (Usher and Priest, 1977) followed a standard format including general information about position, topography and geology, a description of the habitats present, a summary of those species and habitats of special interest, notes on the inferred recreational use, and a concluding section of recommendations for management.

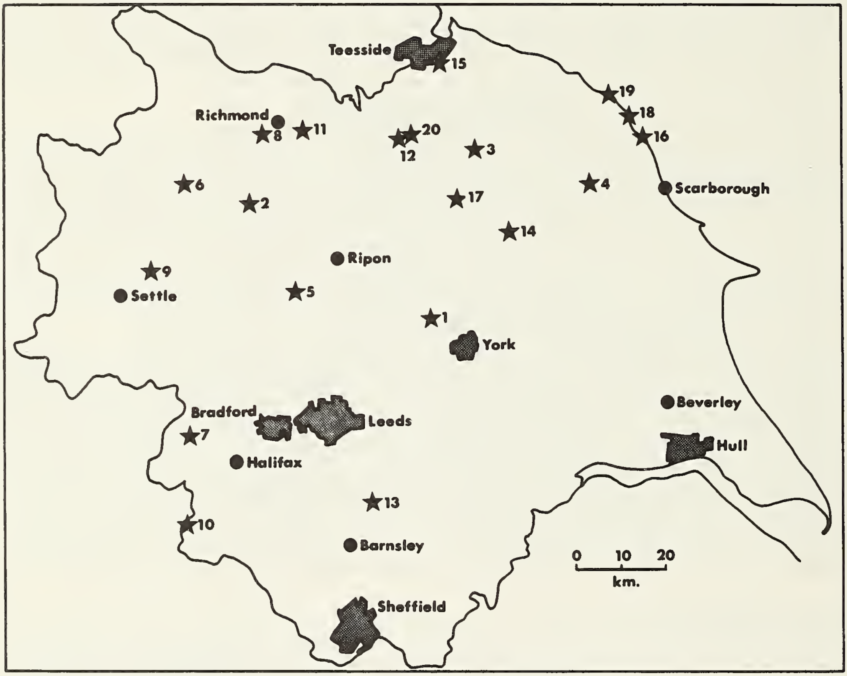

Figure 1. A map of the Yorkshire region of the National Trust showing the location of the 20 properties included in the survey. The numbers correspond with the alphabetical list in Table 1.

Habitats

The properties cover a wide range of habitats from the sea coast to hills in the Pennines. It is possible to recognise four broad groups of terrestrial habitats, which are indicated in Table 1. The class 'Agricultural, Building and Garden' consists of agricultural land where the management is intensive, such as arable crops or improved grassland; it also includes any buildings associated with the property and gardens whether formal, like that at Nostell, or relatively wild, like the mown terraces at Rievaulx. In general; habitats in this category have very limited importance for nature conservation. Their management can, however, be sympathetic towards wildlife; for instance the care of hedges to retain breeding sites for birds

and the avoidance of general applications of toxic chemicals that might decrease floral diversity. The class 'Unimproved Grassland and Scrub' includes all communities of unimproved grassland, whether or not they are grazed, and scrubby communities. In general these habitats have a relatively high pH, unlike those of the class 'Heaths, Moors, Bogs, etc.' which are more acid and tend to be dominated by dwarf shrubs, sedges and rushes rather than grasses. The 'Woodland' category is a general one and includes both conifers and deciduous woodland, whether semi-natural or of plantation origin. No attempt has been made to trace the distant history of the semi-natural woodlands, and hence no data are available on coppice-origin, ancient woodlands, etc. The approximate distribution of each of these classes of habitat is indicated in Table 1, and each, except for 'Agricultural, Building and Garden', is discussed in the following sections.

Table 1

A summary of the distribution of major habitat types on twenty National Trust Properties in Yorkshire. Areas are estimated to the nearest hectare (smaller areas are indicated +), and lengths of streams and rivers (delineated on Ordnance Survey 1:50000 maps by one and two blue lines respectively) are given to the nearest 0.1 km (many of these streams and rivers form boundaries, and are not wholly within National Trust properties). The numbers given before each property name relate to the map of Yorkshire, Fig. 1.

		Approximate area (ha)					Approximate length (km)	
Property	Area ha	Agricultural, Building and Garden	Unimproved Grassland and Scrub	Heaths, Moors, Bogs, etc.	Wood-land	Open Water	Streams	Rivers
1. Beningbrough Hall	152	143	6	—	3	+	0	2.4
2. Braithwaite Hall	303	168	—	117	18	—	2.0	1.6
3. Bransdale	775	675	—	—	100	—	15.7	0
4. Bridestones Moor	353	213	25	92	23	+	5.1	0
5. Brimham Moor & Rocks	146	—	—	141	5	+	0.4	0
6. East Scar Top Farm	117	33	57	28	+	—	1.7	0.1
7. Hebden Dale	150	21	—	9	118	2	1.1	4.8
8. Hudswell	54	12	2	—	40	+	0.2	2.4
9. Malham Tarn	1547	87	1040	318	40	62	3.4	0.4
10. Marsden Moor	2301	—	—	2301	—	—	60.0	0
11. Moulton Hall	10	10	—	—	—	—	0.3	0
12. Mount Grace Priory	5	4	—	—	1	+	0	0
13. Nostell Priory	10	8	—	—	+	2	0	0
14. Nunnington Hall	3	2	—	—	1	—	0	0.2
15. Ormesby Hall	110	96	—	—	14	—	1.8	0
16. Ravenscar	81*	27	47	—	1	—	0	0
17. Rievaulx Terrace	25	4	—	—	21	—	0.6	0
18. Rocket Post Field	5	2	3	—	—	—	0.2	0
19. Saltwick Nab	3*	—	2	+	—	+	0.2	0
20. Scarth Wood Moor	104	—	3	99	1	+	0.6	0
Total	6254	1505	1185	3105	386	66	93.3	11.9

*Ravenscar contains 6 ha of spoil heaps, and Saltwick Nab 1 ha of bare shale.

Unimproved Grassland and Scrub

The extensive grasslands on the hills around Malham Tarn are included within this class of habitats. At the higher elevations (above about 460m) they are characteristically dominated by *Nardus stricta* or a more acid community dominated by *Eriophorum vaginatum*; at the lower elevation, below about 420m, there is species-rich limestone grassland. The most important plant communities of the Malham area are those of the limestone pavements (Ward and Evans, 1975), with such species as *Dryopteris villarii* and *Thelypteris robertiana*, and those in the system of mires at the foot of Great Close Scar (Sinker, 1960), with such species as *Polygala amarella* and *Bartsia alpina*. These mire communities are known to support an extensive fauna including many rare arthropod species such as the spider *Erigone capra* in Great Close Mire. Base-rich and species-rich meadows also occur on both the Hudswell and East Scar Top Farm properties: the latter being particularly attractive with abundant *Geranium sylvaticum*. Limestone cliffs occur at both Malham and East Scar Top Farm, and they support an interesting collection of calcicolous plants, including *Hornungia petraea* and the fern *Cystopteris fragilis*, as well as providing a habitat for a number of cliff-nesting birds.

Less base-rich grasslands and scrub occur on several properties. At Beningbrough Hall the east bank of the River Ouse provides a linear strip, 2.4km long, of relatively unimproved grassland. Osiers have been planted beside the river, and there are stands of the alien *Impatiens glandulifera*. In places the river bank has also been invaded by colonies of such naturalised species as *Veronica filiformis* and *Petasites fragrans*. A mixed grassland, with *Deschampsia cespitosa* and *Juncus inflexus*, occurs on the flat alluvial terrace beside the Staindale and Dovedale Becks on the Bridestones property. Perhaps the most interesting grassland on this property lies between the Bridestone and Dovedale Griffs, coinciding with an outcrop of Lower Oolitic Limestone, but, since it is largely ungrazed, it is being invaded by the surrounding *Calluna vulgaris* and *Pteridium aquilinum*.

Coastal grasslands and scrub occur on three properties, Saltwick Nab, Rocket Post Field at Robin Hood's Bay, and Ravenscar. The two former properties are small, but the latter property contains extensive cliffs, undercliff grasslands, and scrub colonising the shale deposits from the old alum workings. The undercliff contains a mosaic of communities, some areas dominated by *Pteridium aquilinum*, other areas of rough grassland with particularly large flowered *Primula vulgaris* and abundant *Vicia sylvatica*, and wetter areas with *Salix cinerea* and *Phragmites communis*. *Parnassia palustris* is known to occur in the undercliff grasslands.

Heaths, Moors, Bogs, etc.

The eastern heathlands of the North York Moors are represented by tracts dominated by *Calluna vulgaris* on the Bridestones Moor and Scarth Wood Moor properties, though much of the higher elevation land at Braithwaite Hall, above about 320m, is similar. Management of these heather systems is clearly important, since the cessation of regular burning has favoured the spread of *Pteridium aquilinum*. Careful management would favour plants such as the chickweed wintergreen, *Trientalis europaea*, which is not infrequent under the heather on Bridestones Moor.

The extreme eastern heathland variant is the maritime heath found on a small area of Saltwick Nab. These communities are dominated by *Erica cinerea* and *Empetrum nigrum*, though *Solidago virgaurea* and *Plantago maritima* are common in them. *Erica cinerea* is a frequent coloniser of the bare shale spoil heaps at Ravenscar, though both *Calluna vulgaris* and *Deschampsia flexuosa* are also frequent.

The western properties, Marsden Moor, Malham Tarn, and East Scar Top Farm, show a considerable reduction, or even an absence, of ericaceous plants. On the latter property, an area of peat supports a community of *Nardus stricta, Juncus effusus* and *Juncus squarrosus*, though *Trichophorum cespitosum* is frequent. At Malham, the acid communities at the higher elevation usually contain the grasses *Nardus stricta* and *Molinia caerulea* together with *Trichophorum cespitosum* and *Eriophorum vaginatum*. The greatest development of this moorland type is at Marsden Moor, where extensive areas are covered by *Eriophorum*

vaginatum and bare, eroding peat, though on steeper slopes communities dominated by *Nardus stricta, Molinia caerulea* or *Empetrum nigrum* occur.

Brimham Moor and Rocks contains communities that are intermediate between those typical of the east and west of Yorkshire: neither heather nor cotton-grass dominates, and the result is a mixed community of greater diversity. In the drier, rocky area the most frequent plants are *Calluna vulgaris, Vaccinium myrtillus, Deschampsia flexuosa* and *Holcus lanatus*. However, on the slopes down to the Shaw Beck this dry community forms a mosaic with *Pteridium aquilinum* and wetter communities dominated by *Eriophorum angustifolium, Trichophorum cespitosum* and *Molinia caerulea*. The area around the beck is extremely waterlogged, and supports extensive stands of *Narthecium ossifragum* and *Viola palustris*, whilst some of the bogs associated with drainage channels into the beck have areas of *Sphagnum* moss with which are associated *Erica tetralix* and *Vaccinium oxycoccus*.

Included in the area of these communities are the raised bog and tarn fens at Malham Tarn. These communities are complex (Adams *et al.* 1975) and contain a number of nationally rare species (Ratcliffe 1977).

Woodlands

The woodland estate of the National Trust in Yorkshire is relatively small, though many of the properties have small woodland blocks or shelter belts.

The greatest extent of woodland is at Hebden Dale, where management has resulted in a few even-aged stands and the introduction of a plethora of species for amenity purposes. The steepness of the valleys, and the presence of base-rich flushes, give rise to a site that is widely known for its diversity of ferns, mosses and liverworts. The woodland is particularly interesting as the domed nests of the wood ant, *Formica rufa*, are frequent.

In Bransdale there are several coniferous plantations, mostly of European larch, Scots pine, or a mixture of these species. In Barker Plantation, with mature pine and larch, *Deschampsia flexuosa* dominates the ground flora with such ericaceous plants as *Empetrum nigrum*, *Erica cinerea*, *Calluna vulgaris*, *Vaccinium myrtillus* and *V. vitis-idaea. Trientalis europaea* occurs in this plantation. Beside the becks there is a mixed deciduous woodland in which the sessile oak is the most common species, though sycamore, holly, bird cherry, crab apple, rowan, birch, ash, alder, sallow and hazel also occur.

Four smaller woodland areas are of conservational importance. An acid oak woodland occurs to the west of Dovedale Griff at Bridestones Moor: mature *Quercus petraea* dominates the canopy, and there is a sparse ground flora of *Vaccinium myrtillus* and *Deschampsia flexuosa*. Many of the oaks are mis-shapen, being 8–10 m high at the top of the slope, and having a wide range (0.5–1.8 m) of girth. A relatively acid woodland occurs above about 250 m at Braithwaite Hall. Although only about 5 ha in extent, and depleted owing to the presence of grazing stock, there are stands of birch *(Betula pubescens)*, ash and alder in a mosaic of dry and wet streamside and flush areas. This mosaic leads to a very high species diversity.

Two base-rich woodlands of importance occur on the Rievaulx and Hudswell properties. At Rievaulx, the slope below the terrace contains a mixture of oak, wych elm and ash, and an abundant ground flora of *Mercurialis perennis, Circaea lutetiana, Sanicula europaea*, etc. *Hordelymus europaeus* is frequent in all woods on this property. The Hudswell woods contain the large-leaved lime *(Tilia platyphyllos)* and yew *(Taxus baccata)* in an apparently semi-natural condition. Both the understorey and herbaceous layers of these woodlands are extremely rich in species.

Aquatic Environments

The only large area of open water is Malham Tarn, long recognised as a site of international importance (Ratcliffe, 1977). However, small ponds or dams occur on a number of other properties, and associated with these are amphibians and a few plants of wet places. For the conservation of wetland species, especially the amphibians, it is important that such ponds as occur are not filled in or polluted.

There is a particularly long length of streams and rivers (105 km) that either lie in or border National Trust properties. These are often associated with such aesthetically pleasing

communities as the trees beside the River Cover at Braithwaite or the steep wooded valleys of Hudswell and Hebden Dale. By owning or controlling large stretches of water, the National Trust remains in a powerful position to protect the wildlife of such habitats.

Discussion

Much attention in the movement to conserve wildlife has been focussed upon the Nature Conservancy Council (with five National Nature Reserves in Yorkshire at Colt Park Wood, Forge Valley, Ling Gill, Scar Close and Teesdale), local authorities operating under the 1949 National Parks and Access to the Countryside Act (with two Local Nature Reserves at Farndale and Sandal Beat Wood) and voluntary bodies such as the Royal Society for the Protection of Birds and the Yorkshire Naturalists' Trust (with over 40 reserves throughout Yorkshire). The image that the public has of the National Trust has certainly been one of preservation of buildings, neglecting the other part of its role of preserving areas of natural beauty. Although this function has perhaps been too frequently forgotten, the diversity of properties acquired by the National Trust indicates that its agents have been pursuing such a policy. Thus, by the time the survey was carried out, the Trust could boast 20 properties in Yorkshire that contain aesthetically pleasing countryside.

The survey has clearly shown that natural beauty and richness in wildlife can be correlated. Of the 20 properties surveyed, 13 contained nationally rare species or communities of plants that are uncommon in Yorkshire. The seven sites not included in this list, Beningbrough Hall, Moulton Hall, Mount Grace Priory, Nostell Priory, Nunnington Hall, Ormesby Hall and Rocket Post Field, are all either small or are predominantly agricultural. The ecological interest of the 13 properties with uncommon species or communities is frequently as great as that of the County Naturalists' Trust's nature reserves. Thus, perhaps unknowingly, the National Trust has added 13 localities to the 49 nature reserves already designated in Yorkshire.

However, can Natural Trust properties be considered as nature reserves? First, as a result of the survey, areas of importance have been demonstrated and various management suggestions have been made. The National Trust is in a position to implement management practices which are either beneficial to wildlife (by, for example, preventing the agricultural improvement of important, species-rich meadows) or which are sympathetic to wildlife (by, for example, good hedge practices, the maintenance of shelterbelts, and the creation of small copses in an agricultural landscape). Thus, although Trust properties are not nature reserves, the management of them for wildlife can be as effective as management on a designated nature reserve. Secondly, the National Trust has powers to declare an area inalienable, and hence developments can only take place by the will of Parliament. Any site so declared thus has a much greater statutory protection than any site declared as a nature reserve by other voluntary bodies. The National Trust is thus able to safeguard wildlife on its properties over very long periods of time.

Acknowledgements

We should like to thank the many individuals who have given us assistance in the collection of data. In particular, we are most grateful to the Staff of the National Trust for their help and co-operation in the preparation of the report.

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THE CUCKOO WASP, *VESPULA AUSTRIACA* (PANZER) (HYM., VESPIDAE) IN YORKSHIRE

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The years 1976 and 1977 seem to have been exceptional for the occurrence of the rare cuckoo wasp, *Vespula austriaca*, in Yorkshire. Two colonies of the red wasp, *V. rufa*, have also been found with its social parasite, *V. austriaca*. Previously, descriptions of only three other colonies were available (Archer, 1977).

Like other social wasps the queens of *V. austriaca* emerge from hibernation in the spring, although unlike the queens of other species which emerge during April their emergence is delayed until later in May. A queen cuckoo wasp then seeks out a colony of the red wasp, generally kills the red wasp queen and proceeds to lay eggs in the cells, which the worker red wasps rear. The eggs of the queen cuckoo wasp eventually produce queens and male adults, but no workers. Thus after the red wasp workers die the colony will be dead, which occurs about the middle of August.

During 1976, the cuckoo wasp was taken as follows: two queens at Heworth, York (grid ref. SE/65) 22nd 28th June; a male at Allerthorpe Common (SE/74) 25th July and a *V. rufa V. austriaca* colony at Brandsby (SE/57) 28th July. During 1977 a queen was taken at Heworth. York on 21st June and a *V. rufa-V. austriaca* nest was sent to me by Mr. Whiteley of Bradford, who collected the nest at Nab Wood, Shipley (SE/13).

During the nineteenth century the cuckoo wasp was recorded four times in Yorkshire: near Wakefield (1836), Beverley (1882), Pateley Bridge (1884) and Leeds. This century it has been recorded in seven 10 km squares to the west (SD/96, SE/04, SE/06, SE/13, SE/14) and north (NZ/80, NZ/81) of the county. Two of the latter records are recent: SE/14 in 1970 and NZ/81 in 1975. I also took a queen at Fulford, York (SE/64) on 28th June 1971.

Details of the 1976 colony have already been published (Archer, 1977). Details of the 1977 colony are as follows: The next was situated behind an air-brick which was just above the damp-proof course of a building. No adults were present and identification was made from dead queen and male sealed brood still present in some of the cells. The nest consisted of three combs. The first or oldest comb (9.5 × 5.5 cm) consisted of 378 small or worker cells (24 cells empty with no meconia, 200 cells including three sealed brood contained one meconium each, 129 cells including one sealed brood contained two meconia each and 25 empty cells with three meconia each). This comb had therefore produced 529 adults since one meconium can be considered to be equivalent to the production of one adult. The meconium represents the gut contents accumulated during the life of a larva which is evacuated to form a black mass at the base of the cell when the gut cavity is opened to the exterior at the end of the larval stages. The adults produced were *rufa* workers and *austriaca* males; the dead sealed brood were male *austriaca*.

The second comb (10.5 × 8.5 cm) consisted of 307 large or queen cells (110 cells empty with no meconia, 197 cells including three sealed brood with one meconium each). The third comb (5.5 × 5.5 cm) consisted of 134 large cells (102 cells empty with no meconia, 32 cells

including four sealed brood with one meconium each). Thus the large cell combs had produced 222 adults. These adults would probably be male and queen *austriaca*; the dead sealed brood were all *austriaca* queens.

The table below compares the characteristics of this nest with the other four known nests (Archer, 1977). The current nest contrasts with the previous four in its large size due mainly to the addition of an extra comb of large cells.

	Previous four nests	Shipley nest
Mean no combs	2	3
Mean no small cells	315 (range 290–360)	378
Mean no large cells	147 (range 110–170)	441

REFERENCE

Archer, M. E. (1977) A nest of *Vespula rufa* (L.)-*V. austriaca* (Panzer) (Hym., Vespidae). *Entomologist's Gazette* **28**: 263-264.

CARL VON LINNÉ (1707–1778)

Linnaeus memorial stamps issued by: PFA Postens Frimärksavdelning, S-105 02 Stockholm, Sweden.

HEAVY METAL CONTENT OF SOME TERRICOLOUS LICHENS FROM MINERAL-ENRICHED SITES IN NORTHERN ENGLAND

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INTRODUCTION

Many plants are found to be particularly good indicators of the environmental regime to which they are subjected: the presence or absence of a species may, for example, be dictated by the climate or the nature of the substrate. The effects of environmental factors may be manifested in the plant's performance in terms of, for instance, its morphological or physiological vigour. Bioassays may also be used for monitoring the chemical regime. The bioindicational qualities of plants have more recently been employed to monitor anthropogenic changes within the environment.

Lichens and bryophytes have been found to be especially sensitive to these artifically-induced changes, and have been employed, for example, to determine the impact of air pollution on the environment (Ferry *et al.*, 1973; Hawksworth and Rose, 1976; Rao and LeBlanc, 1967; Gilbert, 1968). The majority of monitoring surveys have been associated with the determination of the effects of the sulphur dioxide component of vitiated atmospheres, but there is an increasing awareness of the more complex nature of the atmospheric regime surrounding urban and industrial environments.

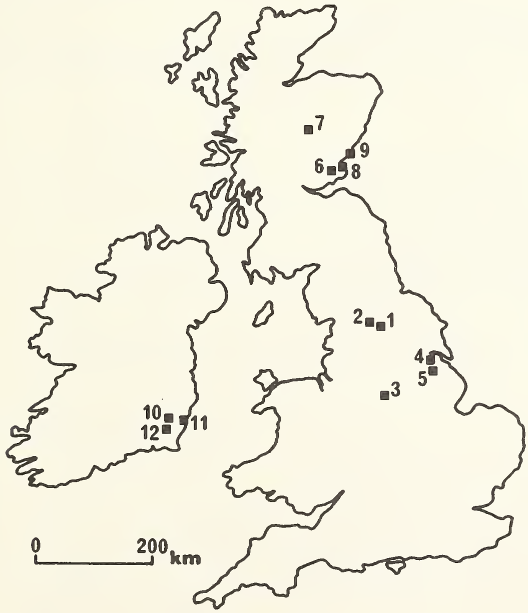

Figure 1. Location of sites in the British Isles from which lichens (nos. 1-12) and soils (nos. 1-8) were collected for heavy metal determinations.

More recently, the heavy metal component has been singled out for further investigation (Nieboer *et al.*, 1972, 1978; Seaward, 1973; Nash, 1975; Rao *et al.*, 1977; Rühling and Tyler, 1968). However, it is difficult to determine the value of lichens as monitors of heavy metal pollution since (1) associated pollutants, such as sulphur dioxide and fluorine, may mask the effect or act synergistically with the metal(s) under investigation; furthermore, these complex field conditions cannot easily be simulated in the laboratory, thereby making it difficult to substantiate field observations by experiment, and (2) lichens are particularly effective in accumulating high concentrations of heavy metals in a wide range of natural situations; it is therefore necessary to determine a species' capacity for uptake before threshold levels can be assessed. In this connection, close attention has been paid to the performance of lichens in metal-enriched soils, mainly associated with mining operations (e.g. Shimwell and Laurie, 1972; Brown, 1973; Lawrey and Rudolph, 1975), as well as those in sites subjected to contamination emanating from industrial (e.g. Nieboer *et al.*, 1972; Seaward, 1973; Laaksovirta and Olkkonen, 1977) and automotive (e.g. Laaksovirta *et al.*, 1976) emissions. A detailed review and critical examination of mineral uptake and release by lichens are provided by Nieboer *et al.* (1978).

A joint programme of research by the Universities of Bradford and Wrocław has been initiated to assess the value of plant bioassay to monitor environments subjected to a wide range of metal concentrations. Some preliminary results and observations are provided here for seven terricolous lichen species from several metal-enriched sites investigated in the north

Table 1
Sources of lichens and soils for heavy metal determinations

Site no.	*Habitat, location, grid reference*	*Collector(s)*	*Date of collection*
ENHANCED CONCENTRATIONS:			
1A	Disused lead mines, alt. 290-320 m, 0.5 km N of Greenhow Hill, Yorkshire; 44/114648	R. Goyal & M. R. D. Seaward	May 1978
1B	As for 1A	E. A. Bylinska & M. R. D. Seaward	Aug. 1978
2A	Spoil heaps, disused lead mines, alt. 335 m, 3.5 km NE of Grassington, Yorkshire; 44/025663	R. Goyal & M. R. D. Seaward	May 1978
2B	Soil near stack flues, disused lead mine, alt. 365 m, 3.5 km NE of Grassington, Yorkshire; 44/027665	R. Goyal & M. R. D. Seaward	May 1978
2C	Smelting area, disused lead mine, alt. 340 m, 3.5 km NE of Grassington, Yorkshire; 44/026664	E. A. Bylinska & M. R. D. Seaward	Aug. 1978
2D	As for 2A	E. A. Bylinska & M. R. D. Seaward	Aug. 1978
3	Disused lead mines, alt. 235-245 m, Masson Cavern, near Matlock Bath, Derbyshire; 43/292587	E. A. Bylinska & M. R. D. Seaward	Aug. 1978
4A	Lowland heath, alt. 25-50 m, Risby Warren, 2-3 km NE of Scunthorpe Steelworks, N. Lincolnshire; 44/9213	R. Goyal & M. R. D. Seaward	Apr. 1978
4B	As for 4A	R. Goyal, E. A. Bylinska & M. R. D. Seaward	Aug. 1978

Table 1 *(continued)*

BACKGROUND CONCENTRATIONS:			
5A	Lowland heath, alt. 30 m, Twigmoor Warren, 3 km SE of Scunthorpe, N. Lincolnshire; 44/056931	R. Goyal, E. A. Bylinska & M. R. D. Seaward	Aug. 1978
5B	As for 5A	R. Goyal	Sept. 1978
6	Old quarry, alt. 150 m, Mount Hill, near Cupar, Fife; 37/333163	P. B. Topham	May 1978
7	Near base of wall, alt. 290 m, Glen Fender, Blair Atholl, W. Perthshire; 27/886667	P. B. Topham	June 1978
8A	Dunes (*Peltigera canina* site only), alt. 5 m, Kinshaldy, Tentsmuir, Fife; 37/500240	P. B. Topham	Aug. 1978
8B	Dunes (*Cladonia furcata* site only), alt. 5 m, Kinshaldy, Tentsmuir, Fife; 37/500240	P. B. Topham	Aug. 1978
9	Grassy banks, Parkhill, Arbroath, alt. 60 m, Angus; 37/645454	P. B. Topham & U. K. Duncan	Sept. 1978
10	Near to base of wall, alt. 175 m, Moylisha, Co. Wexford; S(21)/9267	M. R. D. Seaward	Sept. 1978
11	Amongst heather on exposed hill top, alt. 235 m, Tara Hill, Co. Wexford; T(31)/2062	M. R. D. Seaward	Sept. 1978
12	Amongst heather on quarry spoil, alt. 145 m, Ballyprecas Quarry, near Bunclody, Co. Wexford; S(21)/902547	M. R. D. Seaward	Sept. 1978

of England (see Table 1 and Figure 1); these include numerous sites in the Grassington and Greenhow areas of Yorkshire, which have a long history of lead mining and/or smelting from the time of the Romans to the early part of this century (see Jennings, 1967). The measurements obtained from the metal-enriched sites are compared with background levels determined from material collected from Lincolnshire, Scotland and Ireland (Table 1) and with published data on background and enhanced concentrations (Shimwell and Laurie, 1972; Nieboer *et al.* 1978).

Eight metals (iron, lead, chromium, nickel, zinc, copper, cobalt and manganese) have been analysed, but the cobalt levels in all lichen thalli examined were found to be below the detectable level (i.e. < 0.7 p.p.m.); the concentration of cobalt within the soils associated with the lichens analysed ranged from 0.9 to 15.0 p.p.m. (av. 7.3 p.p.m.). Certain nickel data obtained from this survey have been incorporated into Richardson *et al.* (in press).

Method

Lichens and associated soil (depth 0–2 cm) samples were collected from several localities at each site. The samples were transported in polythene bags and stored for the shortest possible time. Lichen thalli were sorted to eliminate senescent and dead tissue and any extraneous material; the thalli were carefully washed in deionized water and oven-dried for 24 hours at 105°C. Replicates (weight 0.2–0.4 g) were subjected to acid digestion (4 nitric acid:1 perchloric acid); the residues were dissolved in 5 M nitric acid and diluted to 25 cm^3 with deionized water. The soil samples were treated in the same manner, but dilution was made to 50 cm^3. All solutions were analysed by atomic absorption spectrophotometry using a

Pye Unicam SP 192 fitted with a background correction facility. The elemental content of soils and lichens (expressed in p.p.m. dry weight) are presented in Tables 2 and 3 respectively.

Table 2. Heavy metal content (p.p.m. dry weight) of soils collected from sites with enhanced (nos. 1A-4B) and background (nos. 5A-8B) concentrations.

Site no.	*replicates*	Heavy metal content (p.p.m.) *Pb*	*Cr*	*Ni*	*Cu*	*Mn*	*Zn*	*Co*	*Fe*
1A	4	1531.0	22.3	28.3	26.0	1254.0	501.0	14.1	15490
2A	4	944.0	11.3	11.5	34.0	226.0	95.0	3.0	17231
2B	4	536.0	9.4	5.6	19.0	32.0	54.0	0.9	9230
3	10	11860.0	40.0	73.0	279.0	1404.0	12528.0	12.6	29068
4A	27	138.0	36.5	23.0	34.3	1187.0	312.0	6.2	40215
4B	84	112.0	22.9	19.3	224.0	854.0	290.0	9.9	35851
5A	8	40.4	12.3	6.1	13.6	219.0	82.2	4.9	11445
6	5	192.0	11.5	15.2	32.2	339.0	84.0	15.0	14169
7	5	16.0	27.0	13.7	11.2	369.0	48.6	10.0	13051
8A	6	6.1	7.1	3.4	6.9	84.1	22.7	1.8	4989
8B	6	6.1	8.7	4.6	6.4	105.0	18.1	1.8	7036

Preliminary Interpretation of Results

From Tables 2 and 3 it can be seen that there are wide differences in the elemental content of soils and lichens; in the latter case the content differs from site to site and both within and between species. The differences in heavy metal content between lichens on enhanced (1A–4B) and on background (5A–8B) soils are less significant than the differences of the soils themselves. With few exceptions, the background and enhanced metal levels of all lichens analysed are within the ranges tabulated by Nieboer *et al.* (1978); slightly higher background levels of manganese and nickel have been detected on several occasions, but significant differences, in keeping with previous measurements (Seaward, 1973, Table 4), have been found for background levels of iron. Considering the seven species collectively, the ratio for uptake of the different elements in the two major types of environment, i.e.:

$$\frac{\text{enhanced}}{\text{background}}$$ can be presented in the following sequence:

Pb > Zn > Cr > Cu, Fe > Ni > Mn

In other words, terricolous lichens would appear to be better as bioindicators of enhanced levels of lead and zinc, for example, than of nickel and manganese.

Data on lead and zinc accumulation by *Cornicularia muricata* and *Peltigera canina* from the lead-mining area of Blea Black Head, Grassington Moor (grid ref. 44/036678) are provided by Shimwell and Laurie (1972); the measurements obtained, however, show poor correlations with the present survey. Furthermore, Shimwell and Laurie did not endorse the view of Lambinon *et al.* (1964) that lichens usually absorb and retain more zinc than the amounts found in the associated soils, and found that the converse applies to the uptake of lead. It will be seen from a comparison of Tables 2 and 3 that Shimwell and Laurie's view holds good for zinc uptake in metal-enriched sites only, and that terricolous lichens usually have lead levels less than associated soils with either background or enhanced concentrations.

There are no direct correlations, from the data so far assembled (from a limited number of sites), between the heavy metal concentration within the lichen and that in the associated soil for any of the seven species studied. *Cladonia* spp. would appear to be less efficient accumulators of several of the elements studied than *Peltigera* spp., and the enhanced/background ratios (see above) were lower. *Peltigera* spp. are therefore more useful as bio-indicators of mineral-enriched substrates than *Cladonia* spp.; this work supports the findings of other researchers (e.g. Tomassini *et al.*, 1976).

Table 3. Heavy metal content (p.p.m. dry weight) of seven lichen species collected from sites with enhanced (nos. 1A-4B) and background (nos. 5A-12) concentrations

Species	Site no.	No. of replicates	Pb	Cr	Ni	Cu	Mn	Zn	Fe
			Heavy metal content (p.p.m.)						
Peltigera canina	1A	5	620.0	10.5	14.0	19.4	137.0	166.0	3067
	2A	5	2077.0	11.3	11.0	35.0	56.0	588.0	1110
	3	6	363.0	6.2	10.0	24.0	46.2	881.0	930
	5A	8	28.0	6.3	10.9	15.9	130.0	75.2	6505
	5B	8	53.6	7.2	17.5	20.8	217.0	143.0	12717
	6	6	15.6	6.6	6.5	8.3	28.6	69.0	847
	7	6	18.0	12.3	8.8	8.3	275.0	74.0	1511
	8A	6	10.2	5.3	8.1	10.1	51.3	59.6	763
	9	6	17.5	3.8	8.1	10.5	59.0	127.0	443
	10	8	8.6	3.1	3.2	10.3	47.5	71.2	192
P. rufescens	1A	3	225.0	13.3	21.3	22.0	145.0	180.0	6072
	2A	5	1147.0	8.1	9.0	30.0	53.0	790.0	994
	4A	24	79.5	14.6	18.6	28.1	572.0	256.0	29694
	4B	47	46.0	9.5	14.4	23.1	208.0	142.0	22188
Cladonia furcata	1A	5	129.0	3.0	7.0	13.0	16.3	72.0	629
	1B	6	81.0	2.8	3.0	12.4	35.6	68.0	2088
	2A	5	293.0	3.7	3.3	12.5	13.0	50.3	651
	3	6	390.0	5.4	3.3	19.5	36.0	520.0	1584
	4A	24	49.5	7.3	5.4	12.5	76.0	113.0	4573
	5A	8	37.3	5.3	4.9	9.3	45.6	93.6	6453
	8B	6	7.2	2.1	2.0	6.1	11.5	22.8	340
	11	8	20.9	2.2	2.1	5.6	33.9	35.0	652
	12	6	22.6	3.0	2.7	6.3	27.2	35.7	353
C. impexa	2A	5	233.0	88.0	7.0	5.8	18.0	80.4	634
	2C	6	626.0	6.6	4.3	15.0	19.1	72.0	1402
	2D	5	463.0	8.7	4.3	10.8	31.2	134.0	1978
C. uncialis	2A	5	144.0	80.0	7.6	7.5	18.2	81.4	659
	2D	5	79.0	5.4	4.3	11.0	26.4	84.0	598
	11	8	27.0	2.8	2.5	6.1	18.1	39.2	542
	12	8	23.3	3.0	2.5	5.2	23.1	46.3	215
Cornicularia aculeata	4B	8	117.0	6.0	11.5	13.7	69.8	105.0	6316
	5A	6	66.8	3.9	10.0	13.8	37.0	86.1	2866
C. muricata	1A	5	129.0	6.7	18.0	10.4	20.0	122.0	780
	2A	4	156.0	6.3	1.4	8.2	11.1	40.0	473
	2B	4	73.3	8.5	3.6	7.3	10.0	49.0	264
	2C	5	485.0	5.0	5.1	13.2	11.0	93.0	469
	2D	5	644.0	4.7	4.0	12.0	27.4	75.0	954

However, lichens can be effectively utilized to monitor heavy metal pollution surrounding urban, industrial and roadway systems, with pollutant levels in the thallus varying as a function of distance from the source (e.g. Nieboer *et al.*, 1972; Seaward, 1973; Laaksovirta *et al.*, 1976). The accumulation of iron and manganese by *Peltigera rufescens* at Risby Warren (sites 4A and 4B, Table 3), for example, is indicative of airborne contamination from the nearby steelworks (cf. Seaward, 1973). Good comparative information for two similar sites experiencing different heavy metal pollution regimes, relative to distance from the steelworks, is to be found in the bioassays for *Cornicularia aculeata* (sites 4B and 5B, Table 3); this species would appear to be an efficient monitor of lead, chromium, manganese, zinc and iron in this instance (cf. use of *Cetraria* spp. in Richardson *et al.*, in press). However, it will not be possible to test the efficiency of such species until detailed measurements of the heavy metal content of the ambient atmosphere are made; plant tissue and soil measurements alone represent only a part of a detailed analysis that is necessary to comprehend the performance, and hence the bioindicational value, of lichens in environments more widely described as 'mineral-enriched'.

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NOTES ON SOME MICROLEPIDOPTERA FROM SOUTH YORKSHIRE

HARRY E. BEAUMONT

The species mentioned below are mainly those for which there are no previously published records from vice-county 63, local species which have not been recorded for a considerable period of time, or species which were not listed by Porritt and which have subsequently become established. My own records are supplemented by records from two additional sources, from microlepidoptera in the collections of Doncaster Museum, these are of specimens in the L. S. Brady collection dating from 1900 to 1920 and more recent material either collected by Mr. P. Skidmore or sent to him for determination, and from unmounted microlepidoptera collected in the Rotherham Metropolitan Borough and passed to me for identification by Mr. W. A. Ely of Rotherham Museum. For reasons of brevity these latter insects are referred to as the 'Rotherham material' in the notes which follow.

Monopis imella (Hübner)

During 1976 and 1977 a total of six specimens was recorded at M.V. light at West Melton, near Rotherham, the dates of capture ranging from 13th June to 13th September. Previous Yorkshire records are restricted to South Stockton (V.C. 62) in the middle of the nineteenth century (Porritt, 1883) and Spurn (V.C. 61) where it was found among refuse in army huts in June 1950 (Michaelis, 1952).

Caloptilia robustella Jäckh

In 1972 Jäckh separated this species from *C. alchimiella* (Scopoli) and the following year Col. A. M. Emmet (1973) provided in the British literature a means of separating the two species. Within a year *robustella* was added to the Yorkshire list (Dunn, 1974) when a specimen taken at Great Ayton (V.C. 62) on 3rd July 1958 was so identified. During a visit to Doncaster Museum in August 1977 I examined a series of *alchimiella* labelled 'Sheffield' in the Brady collection and found two specimens of *robustella*. These were undated but a specimen of *alchimiella* (sens. strict.) in the same series was dated 2nd July 1915 and it seems likely that the *robustella* would have been collected within a few years of that date. The collection also contained a more recent example, a male taken at Sandall Beat Wood, Doncaster on 21st June 1974 (P. Skidmore). Although the two species can be fairly readily separated on external characters the identity of one of the Brady specimens and the Sandall Beat Wood moth were checked by genitalia examination.

Exaeretia allisella (Stainton)

Porritt gives two Yorkshire localities for this moth, Skipwith (V.C. 61) and Scarborough (V.C. 62) and a third locality was added when a specimen was taken at Linthorpe, Middlesborough (V.C. 62) on 29th August 1919 (Lofthouse, 1921). In 1977 a single moth came to

M.V. light at Adwick-le-Street, near Doncaster on 30th July and three were recorded at M.V. light at West Melton between 1st and 21st August. During a visit to Rotherham Museum late in 1977 a further specimen was discovered among unnamed microlepidoptera there, taken at Rotherham on 28th July 1975 (D. A. Ward).

Eucosma pupillana (Clerck)
Recorded as abundant at Scarborough (V.C. 62) by T. Wilkinson (Porritt, 1883), the only published record. Since 1975 this species has occurred annually in small numbers at West Melton on dates ranging from 22nd June to 21st August and at Denaby Ings, near Mexborough a single specimen was taken flying among *Artemisia vulgaris* on 4th August 1977. The Rotherham material included a single moth from East Dene, Rotherham on 1st August 1977 (W. L. Barringer).

Epiblema foenella (Linn.)
This species is not mentioned by Porritt. The earliest Yorkshire record appears to be of a specimen taken at Eldwick, near Bingley (V.C. 64) (J. W. Carter) and recorded in the Bradford Natural History & Microscopical Society's microlepidoptera record book, 1939. Since that time it has been recorded from Barlby, near Selby (V.C. 61) on 21st July 1968 (S. M. Jackson) and in Doncaster Museum is a specimen from Blacktoft Sands, near Goole on 22nd July 1977 (A. Grieve). Since 1975 it has occurred fairly commonly at West Melton with up to five moths per night between extreme dates of 26th June and 23rd August and several moths were recorded at Denaby Ings between 4th and 24th August 1977.

Epiblema scutulana (Denis & Schiff.)
Two Tortricid larvae found in the basal half of a stem of *Arctium* at Denaby Ings on 3rd April 1977 produced moths on 3rd and 4th June. The larvae of this widespread species are common in stems of thistles but Dr. J. D. Bradley (*in litt.*, 9th November 1977) informs me that there is no previous record of *scutulana* feeding on *Arctium*.

Gypsonoma aceriana (Duponchel)
A single male was taken at Denaby Ings on 6th August 1977, the first Yorkshire record.

Ancylis achatana (Denis & Schiff.)
Another species not listed by Porritt, the first Yorkshire record being provided by a specimen from Strines, near Sheffield and dated 2nd August 1907 in the Brady collection at Doncaster Museum (Skidmore, 1973). Although there appears to be no other published record it certainly seems to be a widespread moth in South Yorkshire at the present time: at West Melton it has occurred fairly commonly between 6th July and 13th August and I have also recorded it from Denaby Ings and Adwick-le-Street. The Doncaster Museum collections contain recent specimens from Cusworth, near Doncaster (P. Skidmore) and Whitgift, near Goole (A. Grieve) and the Rotherham material included several moths from East Dene in 1977 (W. L. Barringer).

Lobesia abscisana (Doubleday)
The first notice of this species in Yorkshire was in 1949 and 1950 when it was recorded as common from Kilnsea Warren (V.C. 61) under the name *Polychrosis fuligana* Haw. (Michaelis, 1951). The only records since that time are of three specimens in the Doncaster Museum collections from Whitgift in July 1976 (A. Grieve) and a single male which I took at Denaby Ings on 13th August 1977.

Lobesia littoralis (Humphreys & Westwood)
Single examples of this species have been taken at West Melton on 26th and 27th August 1975, 1st September 1976 and 1st September 1977 suggesting a small resident population, presumably feeding on cultivated *Armeria.* Originally known as a coastal species there have been an increasing number of inland records from other counties in recent years. Sur-

prisingly there appear to be no records from coastal areas in Yorkshire and the species is therefore an addition to the county list.

Phtheochroa rugosana (Hübner)
Although a widespread species in the south of England, records from the northern counties are extremely few. Porritt records *rugosana* from four Yorkshire localities in different vice-counties, Skipwith (V.C. 61), York (V.C. 62), Doncaster (V.C. 63) and Bramham (V.C. 64). There have been no further records until I netted a single moth at dusk on the edge of Melton Wood, near Doncaster on 8th June 1976.

Aethes beatricella (Walsingham)
Previously unrecorded in Britain north of Cambridgeshire this species was first taken in Yorkshire at Armthorpe, near Doncaster on 28th June 1974 (P. Skidmore) and the following year I recorded several specimens at West Melton and Adwick-le-Street. In March 1977 larvae were discovered commonly in stems of *Conium* at Denaby Ings; fuller details of the occurrence of *beatricella* in South Yorkshire have recently been published elsewhere (Beaumont, 1978). Additional records are of a specimen in Doncaster Museum from Whitgift on 2nd July 1977 (A. Grieve) and among the Rotherham material were two moths, one from Aldwarke, Rotherham on 4th July 1977 (W. L. Barringer) and one from East Dene on 7th July 1977 (W. L. Barringer).

Agriphila latistria (Haworth)
Among the Rotherham material was a single specimen of this moth, taken at M.V. light at East Dene on 10th August 1976 (W. L. Barringer). Previously unrecorded in Yorkshire.

Myelois cribella (Hübner)
A single specimen of this distinctive moth occurred at M.V. light at West Melton on 2nd August 1977. Previously recorded in Yorkshire from Spurn (V.C. 61) where it was found in plenty among thistles in June 1947 and July 1948 (Michaelis, 1951) and the Y.N.U. card index includes a surprising record from Dent (V.C. 65) by J. Briggs on 17th July 1949.

Euzophera cinerosella (Zeller)
Two or three have been attracted to M.V. light at West Melton annually since 1975 on dates ranging from 2nd June to 24th August, suggesting that the species may be resident in the area. There are no previous Yorkshire records.

Euzophera pinguis (Haworth)
Recorded by Porritt from Balby, near Doncaster and Sheffield (V.C. 63) and from York (V.C. 64). There have been no further records until one came to M.V. light at Adwick-le-Street on 19th July 1975.

Homoeosoma nebulella (Denis & Schiff.)
Porritt (1883) records this species from the east of the county at Flamborough Head (V.C. 61) and Scarborough (V.C. 62). There were no further records until 28th June 1974 when it occurred commonly at M.V. light at Armthorpe, near Doncaster (P. Skidmore).

Homoeosoma sinuella (Fabricius)
The first, and only published, record of this species in Yorkshire is of a single specimen taken at Kilnsea Warren (V.C. 61) in July 1953 (Michaelis, 1954). First recorded in V.C. 63 at Doncaster, a single moth on 30th June 1974 (P. Skidmore) it has since been taken at West Melton, two in July 1976 and five between 2nd July and 3rd August 1977 and at Denaby Ings where seven individuals were recorded between 2nd July and 20th August 1977. In Doncaster Museum are moths from Blacktoft Sands, near Goole, on 22nd July 1977 (A. Grieve) and among the Rotherham material were two specimens, one from East Dene on 25th June 1977 (W. L. Barringer) and one from Maltby Wood on 9th July 1977 (W. A. Ely). The number of

records in 1977 suggest that *sinuella* may now be resident in the Rotherham and Doncaster areas of South Yorkshire.

Marasmarcha lunaedactyla (Haworth)

Porritt (1883) included this species in his list on the basis of a record mentioned in Hobkirk's 'History and Natural History of Huddersfield' but expressed the view that it was most probably an error and in his Supplement (1904) he deleted the record. The first authentic county record was from Scarborough (V.C. 62) on 12th August 1962 (S. M. Jackson) and its occurrence in V.C. 63 was confirmed when a single specimen was disturbed from *Ononis* at Woodlands, near Doncaster on 9th July 1974 (P. Skidmore).

Stenoptilia saxifragae Fletcher

First described in 1940, this moth was for thirty years known only from gardens around Dublin where the larvae feed on cultivated saxifrage. Following the occurrence of the first English specimen at Chesterfield, Derbyshire in 1970 the first English colony was located in a garden at Gleadless, Sheffield (V.C. 63) on 7th August 1971 when about a dozen moths were disturbed from the foodplant (Harrison, 1971). It has since been recorded in Yorkshire from the Greystones area of Sheffield (R. Clinging) and a single moth was taken at M.V. light at West Melton on 11th July 1976.

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THE PROVENANCE OF GIZZARD GRIT FROM THE RED GROUSE *(LAGOPUS LAGOPUS SCOTICUS* (LATH.)) OF BLEAKLOW, DERBYSHIRE

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Introduction

Five million acres of moorland in the British Isles are specifically managed to provide optimum conditions for the Red Grouse, *Lagopus lagopus scoticus* (Lath.), to flourish as a popular game-bird. Grouse moors are characterised by an abundance of Ling heather, *Calluna vulgaris*, which is burnt in strips on a rotational basis to give a mixture of young heather for food and older plants for shelter. Although *Calluna* is the main diet of the grouse, at certain times of the year other foods may be taken, such as *Vaccinium* spp. (Yalden, 1972), *Erica cinerea*, *E. tetralix*, *Arctostaphylos*, *Empetrum* and *Eriophorum* (Bannerman, 1963) and insects, especially craneflies (Diptera, tipulidae) (Butterfield and Coulson, 1975). Most of these foods are tough and fibrous, so particles of grit are actively ingested and kept in the muscular gizzard to grind up food and thus aid digestion. Sturkie (1965) gives a summary of research done on the importance of grit in digestion in poultry. To obtain supplies of grit the grouse make regular expeditions to the bottoms of cloughs and hill roads, and when the moor is snow-covered flocks may travel over a mile to obtain grit. As part of the general management of grouse moors, most game-keepers supplement the natural grit supply with artificial grit. This is put down in small piles of a few handfuls each. It is the purpose of this study to find the source of the gizzard grit from birds shot on a managed moor, and to determine whether the supplementary grit had been utilised by the grouse in preference to natural grit which is readily obtainable on the moor.

The Committee of Inquiry on Grouse Disease made a comprehensive study of the Red Grouse and their final report appeared in 1911. As a contribution to this report, Smith and Rastall (1911) researched into the gritting habits of grouse. One experiment involved depriving a captive grouse of grit and subsequently the bird died. This led to concern over the adequacy of natural grit supplies and to the introduction of grit supplementation on grouse moors.

Methods and Results

The area studied is a grouse moor of about 0.5 sq. km. on the north-east side of Bleaklow, Derbyshire (fig. 1). The solid geology is Millstone Grit (Upper Carboniferous, Namurian), overlain by peat supporting a typical moorland flora with *Calluna vulgaris* dominant. Sixteen gizzards were obtained from grouse shot early in the 1974 season, but no record was available of the birds' ages or sexes. Samples of moor grit (grit occurring naturally on the moor and grit supplement put down by the gamekeeper) were collected. Descriptions of these, together with the sample numbers, are provided in table 1. When opened, the gizzards were found to contain leaves and tops of *Calluna*, a few seeds of *Vaccinium* and other plants, and numerous particles of grit.

Size Range

The grit was hand-sieved using BS 410 sieves. Ninety-eight per cent of the total gizzard grit was retained on meshes 6 to 14. These particles are the ones which the grouse actively select. Depending on the size, age and sex of each bird (Kolderup, 1923) there is an upper limit above which the particles are too large to be swallowed. Below about 1.22 mm. the particles

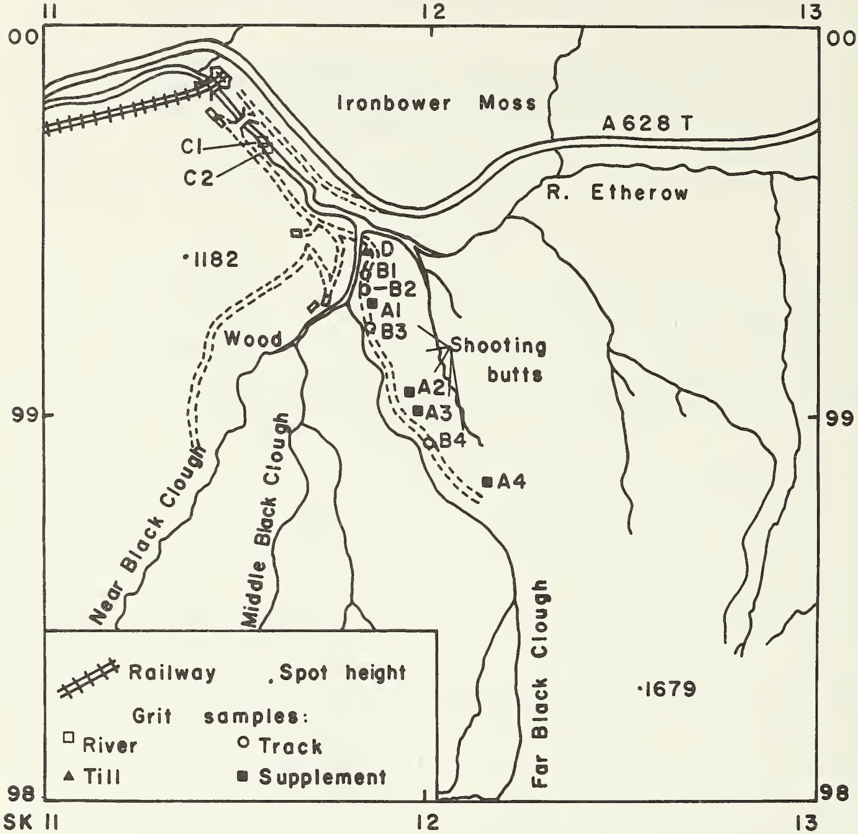

Figure 1. Location map.

No.	Description	Grid Ref.
A1	Grit supplement, dispersed on peat.	117993
A2	Grit supplement.	119990
A3	Grit supplement.	119990
A4	Grit supplement, grouse droppings nearby.	121987
B1	Track grit.	117995
B2	Track grit, grouse droppings nearby.	117994
B3	Bleached grains washed from peat beside track.	118992
B4	Track grit.	119989
C1	Grit from shoal in River Etherow.	115997
C2	Grit from shoal in River Etherow.	115997
D	Till.	117996

Table 1. Numbers and descriptions of grit samples.

are small enough to have been ingested accidentally with food and larger grit particles, as suggested by Smith and Rastall (1911). A chi-squared test was performed on the optimum size range, taking the mean percentages of all the gizzard grit together as the expected percentage and the moor grit samples separately as observed percentages. The size frequency curves are shown in fig. 2, and the results of the chi-squared tests in table 2.

The gizzard grit shows a fairly symmetrical distribution about a mean diameter of 1.77 mm. The grit supplement (samples A1 — A4) differs markedly from this in being positively skewed, that is, the grains are generally larger than those of the gizzard grit. The chi-squared test shows that none of the grit supplement samples have any similarity to the gizzard grit size distribution. Three of the track grit curves (samples B1, B2 and B4) follow the gizzard grit curve quite closely, but sample B3 contains more large grains. Of the river grit samples (C1 and C2), one (C2) is quite close to the gizzard grit mean curve, but C1 differs from it greatly. The curve for till (sample D) is platykurtic, thus the chi-squared test shows it to differ from the gizzard grit distribution.

Roundness and Sphericity

Sphericity was measured using Wadell's method (in Krumbein and Pettijohn, 1938) and roundness was assessed using silhouettes in Pettijohn (1949). Comparisons of the roundness and sphericity means of the samples were achieved using the Student's t-distribution.

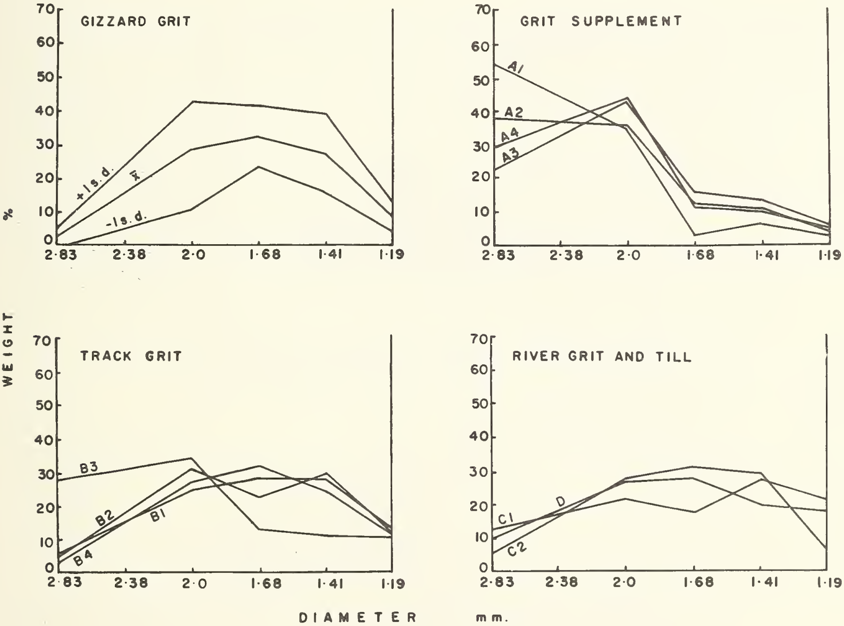

Figure 2. Graphs showing weight percent catchments of the grit samples. The gizzard grit graph shows the mean curve for all 16 samples and one standard deviation on either side. As these are catchments, the actual diameters of the particles will be greater than the mesh diameter of the sieve. Sieve 6 = 2.83 mm., sieve 8 = 2 mm., sieve 10 = 1.68 mm., sieve 12 = 1.41 mm. and sieve 14 = 1.19 mm. The scale on the x axis is logarithmic and follows the "phi-scale" (see Krumbein and Pettijohn 1938) expressed in millimetres.

Table 2. Chi-squared values for the size percentages of the moor grit samples as compared to the (expected) frequency of the gizzard grit.

Sample No.	Chi-squared with 4 deg. of freedom	p
A1	1279.9533	<0.001
A2	597.6366	<0.001
A3	211.1226	<0.001
A4	269.8148	<0.001
B1	6.2232	0.20 — 0.10
B2	6.4049	0.20 — 0.10
B3	309.5498	<0.001
B4	1.2340	0.90 — 0.80
C1	69.0982	<0.001
C2	4.7731	0.50 — 0.20
D	32.7733	<0.001

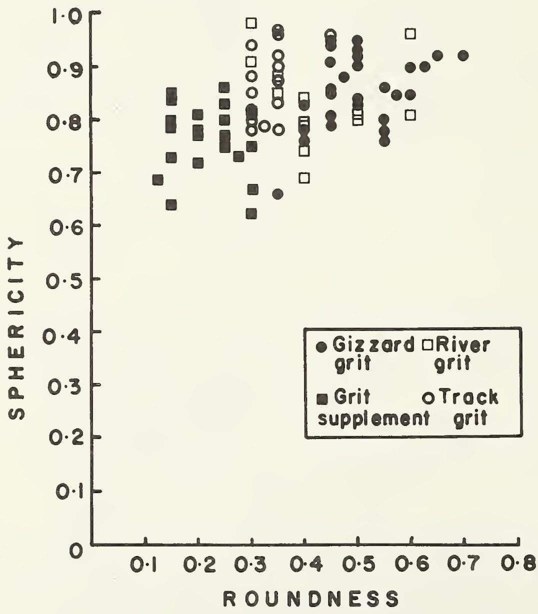

Figure 3. Graph showing correlation between roundness and sphericity values of the grouped samples.

Figure 3 gives the roundness and sphericity values for gizzard grit, grit supplement, river grit and track grit. Tables 3 and 4 give results of t-tests showing the significance of the differences between the roundness means and sphericity means respectively.

Mineralogy

The gizzard grit was composed almost entirely of opaque white quartz grains showing traces of iron staining. A few clear quartz grains were observed. These were polished and had an iridescent lustre. Evidence of the former presence of feldspar associated with the quartz was provided by rhomboidal pits in the surface of the grains.

The grit supplement was composed predominantly of clear and opaque quartz grains. Some shell fragments had been added to aid in egg production.

Grit from the surface of the track was composed mainly of opaque milky quartz. Feldspar crystals could be seen on many of the quartz grains. It is probable that this is derived from the Millstone Grit, which, when fresh, is composed of 97% quartz, 3%feldspar and rock fragments.

The samples of river grit were composed of Millstone Grit rock fragments and some white quartz grains. The till sample contained many particles of fractured quartz and rock fragments, and a large amount of clay and powdered quartz.

Discussion

The size frequency analysis of the gizzard grit showed that the optimum size for the grouse is from about 1.3 mm. to 2.2 mm. in diameter. The grains making up the grit supplement are, on the whole, too large to be easily swallowed by the grouse. Both till and river grit contain particles of the right size for the grouse, but of these only C1 is shown to be a likely source by the chi-squared test. Three of the track grit samples are shown to be likely candidates for gizzard grit by the chi-squared test.

The particles of grit found in the gizzards had high sphericity values (mean 0.85). Rounding, caused by abrasion, is positively correlated with sphericity, but the degree of sphericity is mainly governed by the initial crystal shape. The high sphericity values shown by gizzard grit cannot be entirely explained by abrasion in the gizzard.

Smith and Rastall (1911) found that quartz was always present in gizzards obtained from wild Red Grouse, even if this mineral was uncommon in the locality. Quartz is also preferred

Table 3. Significances of the differences between the roundness means of the grouped samples and the mean for the gizzard grit. Note the very high t value for the grit supplement.

Type of Grit	t	Deg. of freedom	p
Supplement.	4.4225	45	<0.001
River.	1.0490	42	>0.1
Track.	1.0806	44	>0.1

Table 4. Significances of the differences between sphericity means of the grouped samples and the mean for the gizzard grit. River and track grits are not significantly different from gizzard grit.

Type of Grit	t	Deg. of freedom	p
Supplement.	14.0265	45	<0.001
River.	2.7081	42	0.02 — 0.01
Track.	7.9722	44	<0.001

by the Willow Grouse, *Lagopus lagopus lagopus* (Kolderup, 1923) and the North American Ruffed Grouse, *Bonasa umbellus* (Bump *et al.*, 1947). This mineral alone was found in the crops of the East Greenland Ptarmigan, *Lagopus mutus* (Getting, 1937). The Icelandic grouse, which has difficulty in obtaining quartz, uses volcanic rocks and glasses (Kolderup, 1923).

Most game-birds seek out the hardest rocks and minerals in the area. It seems likely that the birds form a specific search image for these minerals, as they do when feeding on tipulids (Butterfield and Coulson, 1975). Colour, size and shape (sphericity and roundness) may be used as selection criteria. No calcium carbonate was found in the gizzard grit. The harsh physical and chemical action of the gizzard may have removed the evidence. If the birds search for hard minerals when gritting, shell fragments, which are fairly soft, would probably not be chosen.

Conclusion

By far the most abundant source of grit on the moor is exposed on the surface of the shooting track. The grit from here was found to be the most similar, in all parameters studied, to that found in the gizzards. The other natural grits may be equally suitable for the birds but are restricted in areal extent. The grit supplement was not utilised by the grouse, although the presence of droppings near some piles indicates that they may have been investigated. Supplementary grit may be attractive to grouse by its white colour but is too large and of the wrong texture to be of use in the gizzard. Additionally, supplying artificial grit in an area of abundant natural grit supply seems to be a futile practice.

Acknowledgements

We thank the departments of Geology, Zoology, Botany and Geography at Manchester University for their services and use of equipment. In particular, we extend our gratitude to Dr. D. W. Yalden and Dr. F. M. Broadhurst for suggesting the project and providing invaluable advice and encouragement.

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THE GASTROPOD FAUNA OF THE HUDDERSFIELD BROAD CANAL

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Two earlier papers (Watkin and Morphy, 1976; Morphy *et al*, 1977) reported the results of surveys of the molluscan fauna of the Huddersfield Narrow Canal. More recently, investigations have been extended to include the Huddersfield Broad Canal, into which the Narrow Canal debouches at its lower end.

The Huddersfield Broad Canal, also known as the Sir John Ramsden's Canal, was opened in 1776, some 20 years before the Narrow Canal. Besides its greater age and width, it differs from the Narrow Canal in other respects which may be of biological significance. Unlike the Narrow Canal it is still navigable and subject to disturbances occasioned by the passage of pleasure craft, the operation of locks, dredging and routine maintenance work. Consequently, it is also deeper than the Narrow Canal.

Another point of comparison concerns the altitudinal differences. The Huddersfield Narrow Canal drops from 198 metres above sea level at the upper end to 69 above sea level at Huddersfield Wharf, a vertical drop of 129 metres over 13.5 km. This contrasts with the Broad Canal which from Huddersfield Wharf drops about 23 metres, through nine locks, to its junction with the River Calder, a distance of approximately 6.5 km.

Finally there is the possible effect of Shaw Foot Mill tail-goit, also known as Aspley Goit, which draws water from the river Colne to provide the Broad Canal with its principal source of supply. This feeder joins the canal at a point just above Huddersfield Wharf.

Methods

The methods used in the present study were identical to those used in the gastropod survey of the Narrow Canal (Morphy *et al.*, 1977). The coverage was also the same, with stations approximately 200 m apart. One standard sweep sample and a snail search and collection were made at each station. The standard sweep sample was taken with an ordinary gauge pond-net (1 mm mesh); the procedure for taking and processing sweep samples has been described in detail elsewhere (Watkin and Morphy, 1976). The search and collection of snails occupied about 5 minutes for each station. The programme of sweep sampling began in October 1977 and was carried out over a period of 10 weeks. The search and collection survey took place over a two-day period in April 1978.

Figure 1 shows a map of the Broad Canal showing the location of sampling stations. It also shows the position of Shaw Foot Mill tail-goit which was not shown in the Narrow Canal map figured in Watkin and Morphy (1976).

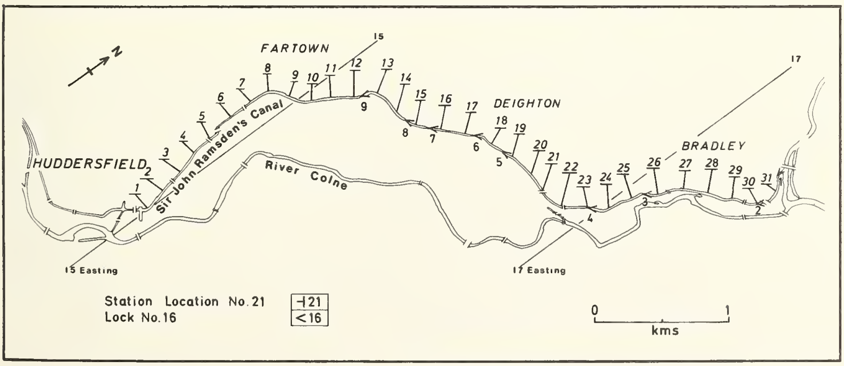

Figure 1. The Huddersfield Broad Canal.

Results

The results of the survey are presented in Figure 2. A total of 7 species of snails were recorded, of which the following six were also reported for the Narrow Canal (Morphy *et al.*, 1977) *Gyraulus albus* (Müller), *Lymnaea peregra* (Müller), *Planorbareus corneus* (L.), *Planorbis carinatus* Müller, *Bathyomphalus contortus* (L.) and *Bithynia tentaculata* (L.). This sequence, the order in which they occurred down the Narrow Canal, provides a convenient series for the consideration of the present results.

In the Broad Canal *Gyraulus albus* was confined to one station in the upper section; this compares with a moderately widespread distribution in the Narrow Canal. *Lymnaea peregra*, which occurred widely in the Narrow Canal, was even more widespread in the Broad Canal, and was absent from only two stations. By contrast, *Planorbareus corneus*, which occurred at only two widely-separated stations in the Narrow Canal, was more generally distributed in the Broad Canal, though absent from the lower reaches.

Two species, *Planorbis carinatus* and *Bathyomphalus contortus*, which were confined to the Huddersfield Wharf station (station 60) of the Narrow Canal survey, appear to have a

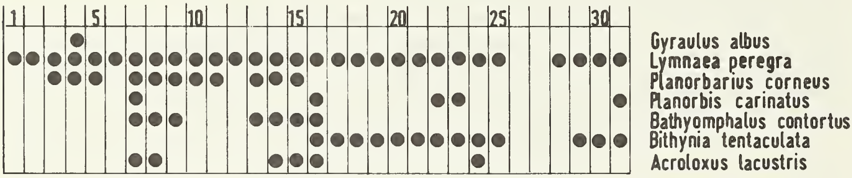

Figure 2. The distribution of gastropods in the Huddersfield Broad Canal.

rather discontinuous distribution in the Broad Canal. *Bathyomphalus contortus* was confined to the middle reach, station 7–16, whilst *Planorbis carinatus* ranged from station 7 down to station 31.

Two species found in the present survey were not recorded in the 1975 Narrow Canal Survey. One of these, *Bithynia tentaculata*, had been recorded previously at Huddersfield Wharf (Station 60 of 1975 survey) in 1973. In the Broad Canal it occurred quite widely below station 15, and its distribution appears to complement that of *Planorbareus corneus*. In this connection it is worth noting that, after an apparent absence of about 5 years, live *Bithynia tentaculata* were recently taken again at Huddersfield Wharf, in February 1978.

The other species, *Acroloxus lacustris* (L.), has not been recorded for the Narrow Canal. In the Broad Canal it exhibited a pattern of distribution somewhat similar to that of *Planorbis carinatus*, though absent from the lower stations.

Discussion

All of the species recorded in the present survey have been reported previously for vice-county 63, York South West (Ellis, 1951). However, the finding of *Gyraulus albus, Bithynia tentaculata* and *Acroloxus lacustris* in SE/11 represent new recordings for this 10 × 10 km grid square; similarly *Planorbis carinatus* and *Bithynia tentaculata* appear to be new records for SE/12 (Kerney, 1976).

Comparison of the results for the two canals reveals some striking differences particularly with reference to those species which were present in the Narrow Canal but absent from the Broad Canal, viz *Potamopyrgus jenkinsi* (Smith), *Ancylus fluviatilis* Müller, *Menetus dilatatus* (Gould), *Physa* sp., *Armiger crista* (L.) *Lymnaea auricularia* (L.) and *Lymnaea stagnalis* (L.). Of these, the first three provide the most striking contrast. *Potamopyrgus jenkinsi* was the most common and most widely distributed of the Narrow Canal gastropods, whilst *Ancylus fluviatilis* and *Menetus dilatatus* were well represented in the upper and lower halves respectively.

Another interesting comparison concerns the close resemblance between the highly distinctive Huddersfield Wharf station (station 60 of the Narrow Canal survey) and many

of the Broad Canal stations. The 1975 survey showed the following 7 species occurring at station 60: *Gyraulus albus, Lymnaea peregra, Planorbarius corneus, Physa* sp., *Lymnaea stagnalis, Planorbis carinatus* and *Bathyomphalus contortus.* Of these, *Planorbis carinatus* and *Bathyomphalus contortus* were peculiar to station 60, and to these might be added *Planorbarius corneus* which was only found at one other station on the Narrow Canal. This association of *Planorbis carinatus, Bathyomphalus contortus* and *Planorbarius corneus*, together with *Lymnaea peregra*, appears to characterise the gastropod fauna of the upper halfs of the Broad Canal. Clearly, the gastropod fauna changes dramatically at Huddersfield Wharf (station 60 of the Narrow Canal survey). Since this station is not subject to the disturbances associated with the navigation of the Broad Canal, another possible explanation would appear to be the impact of Shaw Foot Mill tail-goit. This feeder discharges into the canal at a point where the faunal change occurs (between stations 59 and 60 of the Narrow Canal survey). Moreover, since the closure of the Narrow Canal in the 1950's, the Broad Canal has relied mainly on this supply (British Waterways Broad, personal communication) which is drawn from a reach of the River Colne which was designated grossly polluted (Chemical Class 4) in a recent river pollution survey (Department of the Environment, 1970). It is suggested, therefore, that the substantial inflow of polluted water from the River Colne, via Shaw Foot Mill tail-goit is the major factor influencing the gastropod fauna of the Huddersfield Wharf Station (station 60 of the Narrow Canal survey) and the upper reaches of the Broad Canal.

Pollution may also be of significance further down the Broad Canal. Slightly above station 25, an industrial waste outfall probably accounts for the absence of snails and the scarcity of other invertebrates at stations 25 and 26.

Taken together, the Narrow and Broad Canal studies show a reasonably marked pattern of zonation, in which perhaps, four or more major zones can be recognised. The upper half of the Narrow Canal is characterised by *Ancylus fluviatilis* and *Potamopyrgus jenkinsi*; species which are typically associated with running water. The second major zone extending from station 32–59 on the Narrow Canal features the two alien snails, *Menetus dilatatus* and *Physa* sp. Shore Foot Mill tail-goit marks the beginning of the third zone which reaches down to station 16 of the Broad Canal. This could be called the planorbid zone, with *Planorbareus corneus* and *Bathyomphalus contortus* as the characteristic species. At station 16 there is a transition to the final zone which is characterised by *Bithynia tentaculata*.

A paper on the quantitative aspects of this work is now in preparation for publication elsewhere.

Acknowledgements

We wish to thank Mrs. M. Brooke of Huddersfield Polytechnic for the preparation of Figure 1 and the British Waterways Board for permission to carry out this survey.

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AUTUMN FUNGUS FORAY
Doncaster, 15th to 19th September, 1977

T. F. HERING

After the exceptional autumn conditions we had found in 1976, this was a return to more normal collecting. The mycorrhizal fungi were back in quantity, and some fifteen members found a good deal of interesting material. We particularly remember two rather unfamiliar fire-site fungi (*Geopetalum carbonarium* and *Pustularia rosea*) at Holmes Carr, and great quantities of *Cyathus olla* in the paths at Melton Woods.

I am grateful to Mr. M. J. Richardson for a long list, and to Mr. J. Blunt for a list of ascomycetes.

H = Holmes Carr Great Wood	SK/608984
T = Twelve Months' Carr	SK/643996
M = Melton Woods	SE/512033
C = Cadeby Woods and bank of river Don	SE/529005
S = Sandall Beat Wood	SE/613039

MYXOMYCETES
Dictydium cancellatum C
Mucilago spongiosa C
Physarum nutans C
Stemonitis fusca M

ZYGOMYCETES
Chaetocladium brefeldii T
Piptocephalis arrhizus T
Phycomyces blakesleeanus T (these three on rabbit dung)
Spinellus fusiger on *Mycena* sp. T M

PYRENOMYCETES
Diatrypella favacea on *Corylus* C; on *Betula* M
Eutypa acharii C
Lophiostoma caulinum C
Podospora vesticola on dung *M*
Nectria episphaeria on a Pyrenomycete C
Sporormia intermedia on dung T
Sphaeronaemella fimicola on rabbit dung T M

DISCOMYCETES
Anthracobia melaloma on fire-site H
Ascozonus crenulatus on dung T
A. stictoideus on dung T
A. woolhopensis on dung T
Dasyscyphus apalus on *Juncus* H
Hymenoscyphus caudatus on *Alnus* C
H. scutula var. *scutula* C H
Peziza emileia M
Polydesmia pruinosa on a Pyrenomycete M T
Pustularia rosea on fire-site H S
Pyronema omphalodes, fire-site H

USTILAGINALES
Ustilago longissima on *Glyceria maxima* C

UREDINALES

Melampsora capraearum on *Salix caprea* C
M. epitea on *S. viminalis* C
Melampsoridium betulinum on *Betula* C
Phragmidium violaceum on *Rubus fruticosus* agg. C
Pucciniastrum epilobii on *Epilobium angustifolium* H

AGARICALES

Agaricus langei C
A. silvaticus H
Boletus aestivalis S
B. erythropus S
B. luridus C
B. piperatus M S
Clitocybe clavipes H
C. langei sensu Singer S
C. odora T S
C. rivulosa C
Clitopilus prunulus C S
Conocybe mairei M
C. togularis M
Entoloma sericea M
Flocculina ferruginea M
Geopetalum carbonarium H
Gomphidius maculatus M
Laccaria proxima S
Lactarius torminosus M C
Lepiota cristata M
L. pseudofelina M
Leptonia incana M
Melanoleuca excissa M
Mycena metata T M
M. pura M
M. tenerrima C
M. vitilis M
Pleurotus cornucopiae on *Fraxinus* T
Psathyrella hydrophila S
Russula aeruginea M
R. farinipes M

GASTEROMYCETES

Crucibulum vulgare M
Cyathus olla M C
Lycoperdon foetidum C S
Sphaerobolus stellatus M H

OTHER BASIDIOMYCETES

Laetiporus sulphureus T; and on *Taxus*, H
Merulius tremellosus H M
Ramaria cinerea M

FUNGI IMPERFECTI

Dactylaria psychrophila on rabbit dung T
Rhizoctonia cerealis on *Triticum* M
Rhynchosporium secalis on *Hordeum* M

FIELD NOTES

Bryological meeting at Broughton Hall

A meeting of the Bryological Section of the Y.N.U. was held at Broughton Hall near Skipton (V.C. 63) on 15th April, 1978. It was in this area that John Nowell recorded *Cryphaea heteromalla* and *Pylaisia polyantha* in the middle of the last century, but the area is otherwise little known. It is however important in the context of V.C. 63 since the vice-county boundary extends far enough northwards here to enclose a small area of carboniferous limestone.

The party proceeded to the Hall to examine the grounds in the immediate vicinity. A quick stop on the roadbridge over the Earby Beck had already produced *Grimmia trichophylla* c. fr. on the gritstone of the wall. Inside the grounds the first surprise was the luxuriant moss flora of the lawns, with *Fissidens adianthoides*, *Dicranum scoparium*, *Climacium dendroides*, *Thuidium tamariscinum*, *Calliergon cuspidatum*, *Ctenidium molluscum* and *Rhytidiadelphus squarrosus*. By the path down towards the beck, some gritstone boulders produced *Isothecium myosuroides* and *Plagiothecium denticulatum*. In this area, near the path and lawn edges, members were delighted to see a considerable amount of *Pleuridium subulatum* c. fr. on bare soil, accompanied at one spot by a robust 'erythrocarp' *Bryum*,

apparently a form of *B. rubens.* Here too were *Orthotrichum cupulatum* and *O. diaphanum* on limestone blocks on a wall.

At this point members returned to the Hall through semi-wild gardens and woodland. The ground flora included *Cirriphyllum piliferum* and *Plagiochila asplenioides* var. *major.* Limestones lining the path supported *Brachythecium populeum*, *Metzgeria furcata* and *Plagiochila asplenioides* var. *asplenioides.*

The second part of the excursion concentrated on the partly wooded banks of the Earby Beck, upstream from the roadbridge. *Cinclidotus fontinaloides* occurred sparingly on rocks by the stream. The limestone also had *Oxystegus sinuosus*, *Neckera complanata* and *Cirriphyllum crassinervium.* Further upstream, a calcareous flush in the woods had *Cratoneuron commutatum* and *Plagiomnium elatum. Mnium stellare*, usually a rupestral plant, was found on a tree root, no doubt irrigated by calcareous water. Everyone was on the watch for Nowell's two specialities, but the trees had only the impoverished flora characteristic of South Yorkshire, including *Dicranoweisia cirrata*, *Orthodontium lineare*, *Aulacomnium androgynum* and *Lophocolea heterophylla.* However, *Campylopus introflexus* was collected from one log.

Miscellaneous records at the end of the day included *Weissia controversa* from a bank in a field, *Orthotrichum anomalum* on a wall nearby, and *Isothecium myurum* on a limestone wall by the road.

A total of 67 species was recorded. A number of these had been noted very few times previously in V.C. 63; *Isothecium myurum* has no other record at all since 1900.

Sincere thanks are due to the Tempest family of Broughton Hall for permission to visit the estate. I also thank all members for a most enjoyable meeting and for their lists of species.

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T. L. Blockeel

On the occurrence of *Zostera angustifolia* (Hornem.) Rchb. in the Humber

Further to Brian Pashby's records (*Naturalist*, **102**: 85-90) one positive piece of evidence has come to light in the form of a specimen prepared by the late H. M. Foster of Hull and now in his collection of slides in the Hull College of Further Education. Bearing the label "Zostera, Humber side 12.1933" it is a transverse section of a rhizome of *Z. angustifolia.* Unfortunately the exact locality is not given. The specimen has small groups of sclerenchyma in the outer cortex and, although somewhat shrunken during preparation, it has a maximum diameter of 1.7 mm so that when fresh it would have been 2 mm or more. It was compared with recently collected material of *Z. angustifolia* and *Z. noltii* and I am satisfied that it corresponded with the former.

It is, perhaps, appropriate to put on record the existence of Foster's collection of microslides. Although slightly depleted by breakages and the impermanence of some preparations there are over 4000 items, mostly entomological, and they are now being conserved.

K. Fenton

Red Squirrel licking up honeydew

On 19th June 1978 in a small wood near Windermere, Cumbria, I watched a Red Squirrel *(Sciurus vulgaris)* in a Beech tree *(Fagus sylvatica).* As is not infrequent in this area it was unconcerned by my presence and I was able to observe it at close range through binoculars. At first I thought it was feeding on the leaves but it soon became apparent that it was in fact licking them. In some cases this was accomplished by pulling leaves towards it without detaching them; in others the leaves were pulled off, licked, and then dropped. Many leaves were so dealt with before it moved out of view. Examination of the Beech leaves, including some dropped by the squirrel, revealed them to be sticky as a result of the activities of unidentified aphids. The sticky film which coated them was slightly sweet to the human tongue provided a sufficient amount could be licked and this was presumably the case also to

the squirrel. It seems less likely that it was the aphids themselves and not their product that was being sought.

Although the activity observed is conceivably well known I have found no reference to it. For example it is not mentioned in Shorten's *Squirrels* (1954) though she refers to "beech shoots and the sugary sap of the inner bark of young beech wood" as favoured foods of the Grey Squirrel *(Sciurus carolinensis)*.

Geoffrey Fryer

The Tinder Fungus — *Fomes fomentarius*

After correspondence with Malcolm Clark concerning *Fomes fomentarius* I realised that a discrepancy existed between my spoken address at Pontefract and the printed text (*Naturalist* **103**: 39-57). As the single word error alters the distributional patterns of this fungus rather considerably I herewith amend my statement. Please read on page 53, lines 12-13: Few records of *Fomes* on *Fagus* in Scotland have been traced . . .

Malcolm Clark has collected this bracket-fungus on *Fagus* on the island of Mull (Henderson and Watling, 1978), M. J. Richardson at Glen Lyon, Perthshire on the same host, and D. M. Henderson and myself at Killiecrankie, Perthshire. Ingold (1965) gives the localities of two further Scottish gatherings on *Fagus*. All these records will be discussed in full by A. J. S. Whalley and myself in a publication now in preparation.

Incidentally, Malcolm Clark also drew my attention to the fact that he finds *Sarcoscypha coccinea* in the Midlands, mostly on twigs of *Ulmus* in marked contrast to the experiences in Yorkshire. This is worthy of further examination.

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Roy Watling

AN EXAMPLE OF GULLYING ON ARABLE LAND ON THE YORKSHIRE WOLDS

S. FOSTER

Department of Geography, University of Hull

Little has been published to date on the effects and processes of gullying of arable soils in the U.K. even though this may be a more widespread phenomenon than is usually assumed (Evans and Morgan, 1974). Small scale erosion as described in this note is rarely reported in this country although larger examples of flooding have been described from the Yorkshire Wolds (Anon., 1900; Cole, 1887, 1910; Sheppard, 1903). Gullying occurred between 30th September and 2nd October, 1976 at Elmswell Wold (G.R. SE 997614) approximately 3.5 km (1.5 miles) north-east of Great Driffield. Direct measurements of the processes active during the storm-flood periods were made and the area was surveyed by plane-table after erosion had ceased.

The soils in the area have been tentatively classified as an Andover/Wolds complex, based upon the scheme of Matthews (1975). The Wolds series cap the hilltops and upper convex slopes (between 0.5° and 3°) and the lower concave slopes (2° — 3°). They consist of shallow flinty sandy silts (sand $<200\mu$ — 60μ approx 70% silt $<60\mu$ approx 20%) with an Ap horizon 20–25 cm thick over-lying a Bt horizon (5–7.5 cm thick) of dark reddish brown (5 YR 3/4) to yellowish red (5 YR 4/6) silty clay (clay content between 25% and 40%). The Andover series is found on the steeper slopes (4°–9°) between the upper convex and lower concave slopes. It consists of flinty fine silty sands resting directly upon frost-shattered, angular compacted chalk/flint rubble which is also the parent material of the Wolds series.

The field in which the gullying occurred had been contour ploughed on the lower slopes with two plough traverses meeting in a V down the centre of which ran a temporary track. The average slope on the field was about 6° — 7° ranging from 0.5° on the hilltops to 9° — 10° on the steepest part of the valley sides. A barley crop had been harvested and the stubble burned off leaving less than 2% soil cover. The soil surface was smooth and packed hard by a combination of the long dry summer and raindrop impact. Shallow linear depressions caused by tractor wheels ran diagonally across the unploughed area which lay upslope of the ploughed land. The area of unploughed soil was approximately 600 m², and was bounded by

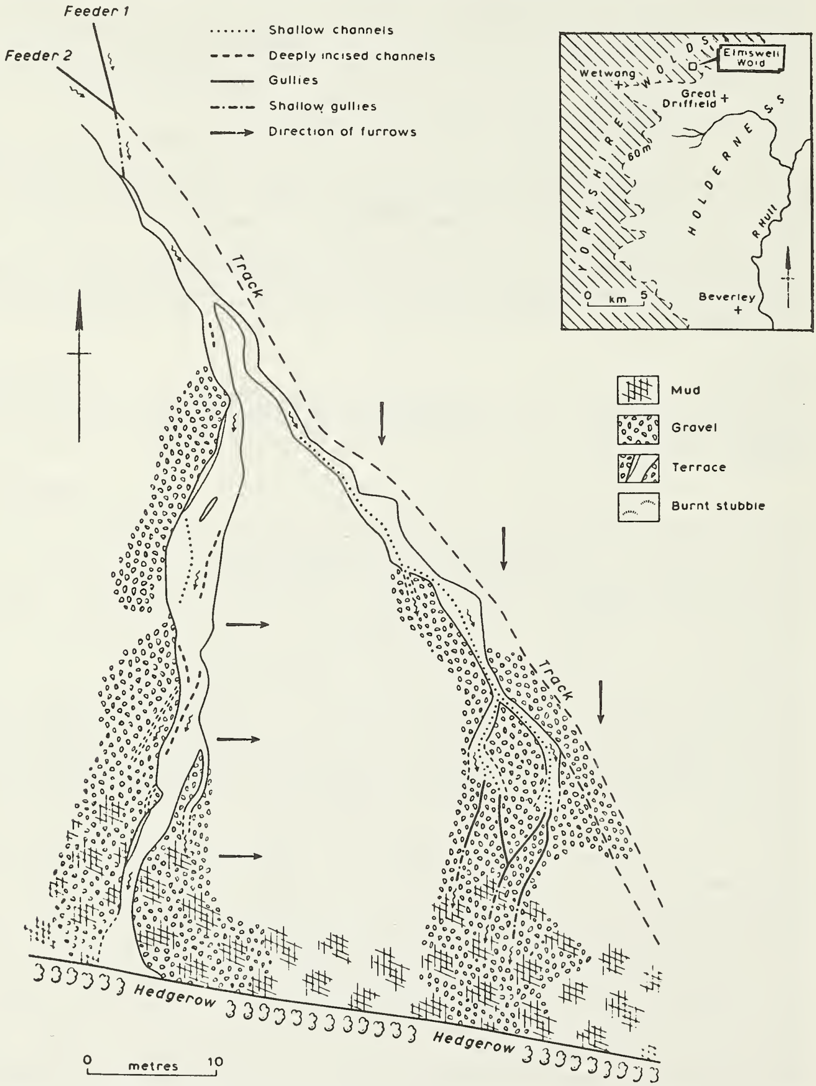

Figure 1. Gullying on arable land at Elmswell Wold surveyed on 4th October, 1976, after erosion had ceased. Gully 1 is on the right.

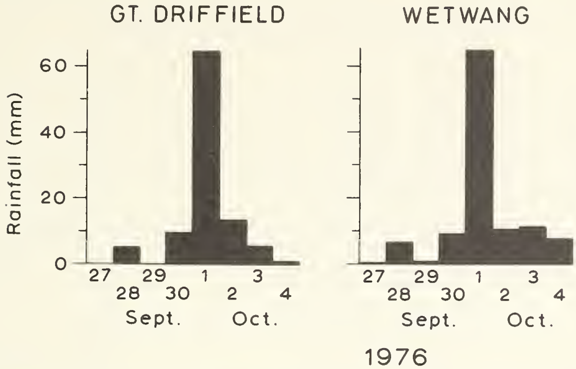

Figure 2. Rainfall data for 2 stations in Yorkshire during the gullying period. N.B. The total rainfall for 1st October (64.8 mm) was greater than the average monthly figure (62 mm).

furrows left after ploughing had temporarily ceased. The furrows became surface streams during the flood periods and are labelled 'feeders 1 and 2' on fig. 1. Rainfall figures for two local stations for the period immediately prior to and during the gullying phase are shown on fig. 2.

Gullying occurred in two phases with an intervening period during which ploughing took place. This moved the feeder channels (i.e. furrows) upslope and caused a second, larger gully system to develop. In both phases torrential rain falling upon unploughed, hard packed and saturated soil caused sheet wash with slightly concentrated flow along the open furrows between the ploughed and unploughed parts of the field. Upon reaching the edges of the ploughed area at the track (see fig. 1) it swept across the smooth packed soil and then flowed over the furrows of the lower slopes of the field where small rills formed. Much chalk gravel derived from the bottom of the furrows was deposited across the track and the ploughed area of soil on the lower slopes. The lower (initial) gully system remained as a series of largely unconnected deep rills supplying a common fan but the second (upper) system coalesced into a single wide channel from which almost all the topsoil and some subsoil was stripped. The

Gully	Gully dimensions			Fan dimensions			
System 1	length	width	depth	length	width	max thickness	soil moved
a.	7.6 m	25 cm	21.5 cm	8.2 m	5.2 m	7.5 cm	1.12 tonnes
b.	8.3 m	20 cm	12.5 cm				
c.	5.7 m	15 cm	11 cm				
d.	9.4 m	30 cm	13 cm				
System 2	73 m	5.1 m	10–15 cm (av)	14.9 m	18.6 m	26 cm	8.6 tonnes
			40 cm (max)				(3.21 t lost from field)

Table 1. Dimensions of Gullies and Fans, Elmswell Wold, Yorkshire (SE 997614)

Table 2. Rainfall and Flood data for the afternoon gullying phase of 2nd October 1976

	RAINFALL				FLOOD			
Flood No.	Start	Finish	Est. total precip.	Est. max. intensity	Start	Finish	Max. water velocity	Max. discharge
1	2.10 pm	2.35 pm	0.5 mm	2.0 mm/hr	No data collected			
1	3.35 pm	3.42 pm	0.5 mm	5 mm/hr	3.37 pm	4.20 pm	0.6 m/sec	3.47 pm– 90 cm^3/sec.
3	5.45 pm	10 pm	3.0 mm	>5 mm/hr	5.46 pm	after 10 pm	5.47 pm– 1 m/sec; later >1 m/sec	125 cm^3/sec; after 12 mins– 175 cm^3/sec; later >200 cm^3/sec estimated

soil was deposited as a large fan at the foot of the slope where a hedgerow checked the waterflow and prevented major soil loss. The dimensions of both gully systems are given in table 1, and a brief record of events on the afternoon of 2nd October on table 2. There was much evidence to show that during a late stage of flood 3 water had spilled from the upper into the lower gully system, as further erosion was recorded on the morning of 3rd October after flooding had ceased.

On the evening of 2nd October during the final flood period two small quartizite pebbles (2.5 cm dia.) were moved 20 m and 22 m during an early stage of flooding; later in the evening they moved 27 m and 40 m downslope and a larger quartizite pebble (10 cm × 2.5 cm) moved 27 m during the late evening. A water sample, taken at 6.15 p.m. when the discharge was temporarily falling, contained on analysis a suspended sediment load of 571 mg/l., a total hardness of 44.8 ppm and a calcium hardness of 38.6 ppm.

Conclusions

The flood was caused by an unusual and fortunately rare combination of circumstances, the effects of which were limited to a relatively small amount of soil erosion. One or two important conclusions can be drawn from this study.

Firstly, had the upper slopes been ploughed initially this event would probably not have happened, as there would not have been a low permeability catchment area for the water to drain from. Secondly, it was noted that the time interval between the start of rainfall and the start of flow in the gully decreased during each successive storm period; this almost certainly reflects the degree of saturation of the topsoil in the unploughed catchment area, i.e. the topsoil had to be saturated before overland flow could occur.

It seems likely that much of the colluvium found in the bottoms of the dry valleys in the Yorkshire Wolds may have been derived at least in part by erosive events such as that described above. How much influence the removal of a continuous natural vegetation cover has had upon the downslope movement of soil material is not known, but it is clear that heavy rain falling upon bare soils on interfluve areas can have considerable effects. Taken over an extended period of time this could help to account for the thicker valley and lower footslope soil accumulations on the Yorkshire Wolds.

Acknowledgements

The author would like to thank Miss L. Latham for her kind help and co-operation in allowing access to her land both during and after the period of the floods. I would also like to acknowledge the help given by various members of the technical staff of the Department of

Geography, Hull University during the preparation of this paper. Thanks also to J. Milne for assistance with the surveying and to Drs. R. Ferguson and J. Catt for reading the text.

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SANDSTEDE'S *CLADONIA* EXSICCATA

The Sandstede *Cladonia* exsiccata, housed in the Leeds University Herbarium, Baines Wing, Department of Plant Sciences, is now available for consultation on application to Professor H. W. Woolhouse, or to Mr. G. A. Shaw, Herbarium Curator. It has been in the Department for almost fifty years.

Heinrich Sandstede (1859–1951), the son of a German master-baker, had as a child to deliver bread-rolls before attending school. He assumed the running of the family business very soon after serving a customary roving apprenticeship with masters in Bavaria, the Rhineland, Westphalia and Holstein. The urge to explore his surroundings botanically already hallmarked his leisure activities. Not until 1912, however, did he at last feel free to retire from the responsibilities of the bakery and devote himself entirely to his lifelong love of plants. He rapidly won recognition as one of the leading lichenologists of his day, a nationally celebrated figure, honoured by Hindenburg. His *Cladonia* exsiccata, a magnificent taxonomic achievement, consisting of 1886 packets with detailed morphological notes and comments, was issued altruistically free of charge to 51 Institutes and lichenologists (1918–1929). Sandstede was also responsible for the section of Rabenhorst's Kryptogamen-Flora dealing with the genus *Cladonia*, and his treatment of species contains numerous references to specimens in the exsiccata.

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A. Henderson and G. A. Shaw

BRYOLOGICAL REPORT FOR 1977

Two field meetings of the Bryological Section have been held during the year, the Spring meeting at World's End, Sandburn, V.C. 62 and the Autumn week-end meeting in the S. Cave area of V.C. 61. Both are reported elsewhere and were much enjoyed.

Two new V.C. records, both made by Mr. T. Blockeel, were *Bryum torquescens* from the magnesian limestone at Brockadale, Wentbridge 44/51, and *Orthotrichum sprucei* from the root of a sycamore by the R. Aire west of Skipton 34/95, both in V.C. 63. This latter species was mentioned in the 1976 report when Mr. Blockeel found it near the R. Ribble, and he has now found it again on sycamore near the R. Wharfe at Harewood, which extends its range considerably.

Other interesting records include *Barbula unguiculata* var. *cuspidata* from the Knaresborough Ringing Station reserve by Mr. F. E. Branson in 1975, a variety very seldom

recorded; in fact the only other records we have are W. Ingham's from Malham in 1907, V.C. 64, and Stamford Bridge V.C. 62 in 1906. Mr. T. Blockeel has again been doing excellent work in V.C. 63, finding many species unrecorded since the turn of the century. These include *Grimmia doniana* from Whalshaw Dean 34/93 and Langsett 44/20; *Zygodon viridissimus* from Lindrick Common 43/58, W. of Skipton 34/95, and Thornton-in-Craven 34/94; *Pohlia cruda* from Abbey Brook, Derwent Valley 43/19; *Trichostomum sinuosum* from near East Marton 34/95, Brockadale 44/51, and Roche Abbey 43/58; *T. crispulum* from Lindrick Common 43/58; *Barbula trifaria* from Carleton Bridge, Skipton 34/95; *Phascum curvicolle* and *Aloina aloides* both from Brockadale 44/51; *Pottia bryoides* from near East Marton 34/95; and *P. lanceolata* from Lindrick Common 43/58.

Many species will need drastic revision when the new Moss Flora is published and with new nomenclature and different criteria for determining identity. This will include *Pohlia* species, especially those with axillary bulbils. Mr. Blockeel has turned up *Pohlia camptotrachela* in two localities in V.C. 63 and also *P. drummondii.*

I would be grateful for any records of *Pohlia* with axillary bulbils in order to clarify their status in the county.

F. E. Branson

BOOK REVIEWS

A Field Guide to the Nests, Eggs and Nestlings of North American Birds by **Colin Harrison.** Pp. 416. Collins, 1978. £6.50.

A new addition to the extensive list of Field Guides from Collins, this latest work is perhaps more useful for reference than for use in the field. The book contains a representative series of illustrations of nestlings, superbly executed by Philip Burton, showing virtually all of the precocial (downy) and many altricial (naked) young of North American species. These fine plates are also complemented by 47 colour plates of eggs, photographed mainly by F. Greenaway, illustrating nearly all of the North American breeding species.

The text is packed with information covering most aspects of the species' breeding cycle from habitat to nest site and construction, incubation and fledging periods to clutch size and care of young; it also points out sections that are as yet unknown which will stimulate interest and research from many observers. This book is far more than a 'field guide': it is an absolute mine of concise information that fills the niche left by the conventional identification field guides and is to be used in conjunction with these other guides as a work of reference. I stress this point because it could be argued whether it is wise to publish popular works of this nature which stimulate interest in the breeding habits of birds. However, there are clear warnings given at the beginning of the book on its use; a few simple rules are laid down, including: '. . . to disturb as little as possible . . . remembering that a little carelessness can bring about the accidental destruction of nest and brood'.

Briefly summing up, a superb book, very attractive and informative when used as a work of reference but not much use in the field.

S.C.M.

Birds of Derbyshire by **R. A. Frost.** Pp. 182. Moorland Publishing Company, Buxton. 1978. £6.00.

An excellent account of the status and known history of all bird species known to have occurred in Derbyshire in recent times. The first part of the book contains a very useful and interesting account of the structure and habitats of the county, together with a brief historical account of ornithology in Derbyshire.

273 species (the acceptable county list) are treated in this review of the county's bird-life

and each account summarises what is known of each species in Derbyshire on habitat, distribution and numbers or densities and, for migrants, typical and extreme dates of occurrence. A further 12 species are unacceptable after review: these include a few old records of Nearctic species from the last century, i.e. Tree Swallow, Red-eyed Vireo and Passenger Pigeon. There is also a very interesting appendix on fossil remains from the county — the Eagle Owl was recorded between 8,000 and 10,000 years ago. Another useful feature is the reproduction of the *BTO Atlas* survey maps which complement the stimulating and interesting text.

It would be nice if more county avifaunas were as easy to read and yet so fascinating and factual as the Derbyshire one. Roy Frost and the Moorland Publishing Company are to be congratulated on the high standard of this publication, which is attractively illustrated with many black and white photographs both of the habitats within the county and of some of the birds themselves.

S.C.M.

A Field Guide to the Reptiles and Amphibians of Britain and Europe by **E. N. Arnold** and **J. A. Burton.** Pp. 272, with 257 coloured illustrations and 94 line drawings by **D. W. Ovenden.** Collins, 1978. £4.95.

Rather than simply add another glowing review to the long list of credits obtained by this guide, we decided to try it out in the field on a group of species unfamiliar to us. We took the book with us on an undergraduate ecology field course in the Malaga Province of southern Spain.

On no occasion were we unable to convince ourselves of identifications made from the book despite the enormous colour variation in many species, especially the Wall Lizards. Whether our identifications were right, is, of course, another matter!

Besides the valuable keys, species descriptions and excellent illustrations, the book is packed with diverting details such as the tip that should you run out of preserving fluid while lizarding in Greece, than ouzo will make an admirable substitute. The front and back inside covers are blank, and could well have been employed as a picture key-cum-index as in Mitchell's *Trees* and Higgins and Riley's *Butterflies* from this publisher.

The book is recommended without reservation. The illustrations alone make it worth every penny.

M.J.C., M.R.D.S.

A Key to Adult Males of British Chironomidae by **L. C. V. Pinder.** Vol. 1, 169 pp; vol. 2, 113 pp; with 189 figures. Freshwater Biological Association, Scientific Publication No. 37. 1978. £4.50.

The non-biting midges of the family Chironomidae are represented by about 450 species recorded in Britain. The probable total is perhaps nearer 500. The larvae of Chironomids are to be found in every conceivable aquatic habitat from water-filled tree holes to the inter-tidal zone. The ecological importance of these organisms in aquatic ecosystems is immense. Because of taxonomic difficulties our knowledge of this important group of insects leaves much to be desired. To a large extent the taxonomic problems have been compounded by the preoccupation of previous workers with pinned specimens of adults. Previous keys to British species have suffered from this affliction. Dr. Pinker, in following the practice advocated by Schlee, has worked from fluid-preserved specimens subsequently mounted on slides. The result is the first satisfactory key to male Chironomids that a non-specialist can use with reasonable confidence he will arrive at a correct answer.

Volume 1 provides a good, adequately illustrated, key to adult males (following a concise and useful introduction on morphology and methods). 439 of the 448 recorded British species are included. Some of the omissions are due to misidentifications, some due to a lack of specimens. Volume 2 illustrates the taxonomically invaluable male hypopygia (abdominal

terminalia). These figures provide an excellent means of confirming an identification arrived at by means of the key in volume 1. The quality of these drawings, executed by Angela Matthews, are what make this key something one can commend to the non-specialist.

The publication of this key provides the tool that will facilitate a rapid advance in our knowledge of the ecology of individual species of Chironomidae. It is to be hoped that Dr. Pinder's work will serve to remove the Chironomidae from the category of 'impossible groups'. This publication represents a milestone in the advance in our knowledge of British aquatic insects.

R.H.L.D.

Capreolus. The Story of a Roe Deer by **R. Chaplin.** Pp. 80, with several line drawings. Collins, 1978. £2.95.

An attractively written account of the life history of a roe deer buck based upon the author's observations. Primarily for the younger reader for whom it is highly commended.

Richard Jefferies by **Edward Thomas.** Pp. x + 306. Faber Paperbacks. 1978. £2.25.

This loving but objective assessment of Jefferies' life and work in his protean roles of social commentator, topographer and lover of nature, first appeared in 1907. It loses none of its stature with the passage of time. In 1938 Mrs. Q. D. Leavis recognised it as "a classic of critical biography", a verdict one can only endorse.

A.H.

Back from the Brink by **G. Mountfort.** Pp. 192, with 25 figures. Hutchinson. 1978. £5.50.

This is an account of several different successful episodes in wildlife conservation. The author has been associated with many of them and is thus able to bring considerable authority to his account. The examples cited range widely throughout the world and include the Indian lion, the Hawaiian goose, the orang-utan of south-east Asia, the wildlife of the Galapagos Islands, the Arabian oryx and the vicuna of South America. Mr. Mountfort has an easy, engaging style of writing which readily communicates the circumstances leading to the conservation of species and the measures taken to prevent their decline in numbers. In the final chapter the author draws attention to the tasks ahead; these include the active conservation of many more species approaching dangerously low numbers and the need to educate those who see little point preventing this happening. All in all this is a readable and informative account. There is a further point the author might have made: the success stories described are only success stories as long as the protective pressures described are in force at the time of writing. Circumstances change with time and one wonders how secure the white rhinoceros is in Uganda, the lion and tiger are in India and the orang-utan throughout its range. Some of us do not share Mountfort's implicit confidence.

M.J.D.

Henry Doubleday: the Epping Naturalist by **Robert Mays.** Pp. 118, with four plates, one in colour. Precision Press, Marlow. 1978. £4.20.

There were a number of Doubledays of moderate eminence in the nineteenth century. Most of them were Quakers, and several had some interest in natural history. The Henry Doubleday who gave his name to the Research Association at Bocking in Essex was a cousin of the subject of this biography. The Edward Doubleday who was employed in the Department of Entomology at the British Museum (Natural History) was his younger brother. He himself remained an amateur, travelled very little, and did not publish much. Yet Edward Newman, editor of the *Zoologist*, wrote of him: 'Mr Henry Doubleday lives at Epping in Essex, and knows more of British butterflies and moths than all the other entomologists in the Kingdom; he never sells nor deals in books nor insects, but has acquired all his knowledge solely to gratify his ardent love of the science and for the purpose of instructing others.' Very little is known about him, apart from the facts that can be gleaned from what may be referred to as his 'scientific remains'. These are his ornithological records

published after his death in Miller Christy's *Birds of Essex* (1890) and the rather fewer plant records he contributed to Gibson's *Flora of Essex* (1862); his only considerable published work, the *Synonymic List of British Lepidoptera* (1847–50); his fine collections of British and European Lepidoptera that are now in the British Museum (Natural History), after spending many years at Bethnal Green Museum; and the remains of his collection of British birds, mounted by himself, now to be found in the Passmore Edwards Museum, after passing through various hands.

This shortage of hard facts repeatedly leads his biographer into speculation. For instance, Doubleday certainly corresponded with the French authority Guenée, although not much of the correspondence is available; and he certainly went to Paris for ten days in 1843. This is his only known excursion abroad, but unfortunately the diary he is alleged to have kept of his travels is not to hand. So, says Mr Mays: 'it would be surprising had he not been the guest of Guenée.' Later, Richard Weaver, writing in the *Zoologist*, mentions that Doubleday had a French naturalist staying with him in 1854. 'It is likely that Guenée paid a return visit,' concludes Mr Mays. It is of course possible that Weaver's 'French naturalist' and Guenée are one, but there is no justification whatever for the phrase 'return visit'.

Nevertheless this biography is evidently a labour of love, and from the collection of little scraps of information the author has gathered together an interesting picture emerges of a shy and retiring individual, not very successful in the grocery business he had inherited from his father, but passionately devoted to the study of natural history, and who probably had more influence on his contemporaries than he has on posterity. The book contains many snippets of information about country life in south west Essex in the nineteenth century and about many persons other than Doubleday himself, which makes the lack of an index only the more irritating. References to the literature are scattered amongst the notes printed in small type on the last twenty five pages, so that to find a fact or a person one has to scan the whole book, and to trace a reference is even more difficult. These drawbacks are undeniable, but if one starts at the beginning the book reads easily enough through to the end, and there is much of interest. It is illustrated with a colour plate, photographs and end papers showing a view in Epping Forest, and is very reasonably priced.

F.H.B.

Upper Teesdale. The Area and its Natural History edited by **A. R. Clapham.** Pp. 238 + 8 coloured and 24 monochrome plates, with 37 text line drawings and coloured maps on endpapers. Collins. 1978. £7.50.

For the first time the full spectrum of the natural riches of this outstanding area of Britain can be properly judged (but alas too late for the Cow Green enquiry!). This excellent compendium draws together diverse strands of information, such as the botany, zoology, geology, climatology and topography, in a most pleasing manner by the foremost specialists. Editor, contributors and publishers are to be congratulated.

Flowering Plants and Ferns of Cumbria by **Geoffrey Halliday.** Pp. x + 50, plus 1 plate and 6 distribution maps. Occasional Paper No. 4, Centre for North-West Regional Studies, University of Lancaster. 1978. £1.50, paper-back.

Check-list flora of vice-counties 69 and 70, which provides some indication of the past and present frequency within the three major regions of Westmorland, Furness and Cumberland. The present flora can be summarised as follows: 1429 species, 90 hybrids and 111 garden escapes; 156 species have not been recorded since 1962 and reflect the continuing decline in the county's flora.

The Naturalist in Britain by **David Elliston Allen.** Pp. xii + 292, plus 8 pages of plates. Penguin. 1978. £1.25, paper-back.

A reprint (but lacking the original chapter-head illustrations) of this delightful book first published in 1976 at a cost of £9.00 and reviewed in the *Naturalist* (**101:** 34). It is pleasing to report its availability at such a bargain price.

Exploring Woodlands and Forests by **Scott Leathart.** Pp. 115, with many monochrome photographs and line drawings. EP Publishing Ltd., Wakefield. 1978. £3.95.

Anyone who loves woodlands and forests will find this book enjoyable and useful if they want to begin to find out about forestry in the British Isles. Readably and informatively the tree lover is provided with a historical background of British forestry, a description of our ancient and modern forests and the practice of forestry, and there are also chapters on forest soils, flora and fauna as well as lists of places to visit, books to read and societies to join. The presentation is attractive and the copious black and white illustrations are remarkably clear despite the limitations of monochrome. The armchair amateur will find pleasant browsing, the serious explorer will find a reliable factual starting point and guidance for future studies.

R.L-S.

Water Analysis: Some Revised Methods for Limnologists by **F. J. H. Mackereth, J. Heron** and **J. F. Talling.** Pp. 120. Scientific Publication No. 36, Freshwater Biological Association, The Ferry House. Ambleside, Cumbria LA22 0LP. 1978. £2.50, paper-back.

An enlarged and extensively revised version of FBA's Scientific Publication No. 21, last published in 1963, providing details of methods and apparatus for the measurement of those gases, ionic solutes, forms of nitrogen, phosphorus and other elements, and organic matter which are of biological significance. A comprehensive bibliography and valuable list of names and addresses of suppliers of reagents and equipment are also provided.

Biological Management and Conservation by **M. B. Usher.** Pp. xiii + 394, plus 19 photographic plates, and numerous line drawings and tables in the text. Chapman and Hall. 1978. £5.95, paper-back.

A welcome appearance of this important work in paper-back form, which will be of value to biological and environmental students, as well as conservationists, planners and naturalists. Many examples of management and conservation are drawn from studies of Yorkshire habitats.

Nature Photography by **Arthur Gilpin.** Pp. 115. Countryside Leisure Series, EP Publishing, Wakefield. 1978. £3.95.

There are many aspects to natural history photography, each requiring a complement of distinct techniques. This book briefly introduces these to the reader possessing a basic knowledge of photography.

The first chapter surveys the "tools of the trade" and includes a large section on the construction and siting of hides. The following chapters present the "tricks of the trade", a chapter each being devoted to the photography of mammals, birds, other vertebrates, plants and insects. The coverage given is by no means equal however, with, for example, almost twice the allotment given to birds as plants.

A serious criticism is the extent to which space is given up to illustrations, often without any apparent instructive purpose. One feels that much of this space could have been put to better use to give a more thorough and balanced treatment.

P.J.S.

Vernacular Architecture of the Lake Counties. A Field Handbook by **R. W. Brunskill.** Pp. 164. Faber. 1978. £2.45, paper-back.

The many photographs in this book give a sound basis for a review of the work of local craftsmen from 1350–1850, as well as providing a testimony to their skill in construction of lasting structures from local materials. The reader is led through the evolution of basic design of dwellings to suit the changing needs of the inhabitants and changes in decorative and structural design are illustrated by abundant sketches. A useful feature is the inclusion of two 'Vernacular Trails' in Troutbeck and Milburn which enable a visitor to see a wide range of interesting features in a limited visit. For the serious student there are suggestions for further study and an ample bibliography.

A.R.C.

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THE YORKSHIRE NATURALISTS' UNION

OSTEOMORPHA ARNAUD — A VALIDATION

ROY WATLING

Royal Botanic Garden, Edinburgh

BRYCE KENDRICK

Department of Biology, University of Waterloo, Ontario

During the 1977 Spring fungus foray of the Yorkshire Naturalists' Union collections were made of resupinate fungi, many belonging to the Corticiaceae. The weather conditions prior to the meeting had obviously been ideal for the growth and fructification of resupinates, as most of the material was in good condition. So often, members of the Corticiaceae and related families are found lacking mature basidia or other distinctive structures, and it is unfortunate that some collectors are reluctant to discard even such taxonomically useless material.

Amongst the collections from Ilkley were several fully mature specimens belonging to the hydnoid fungus *Trechispora farinacea* (Pers. ex Fr.) Liberta (= *Cristella* s. Donk). One particular basidiome was covered in a powdery white to cream-coloured mycelial growth which in places formed cushion-like structures.

Under the microscope, characteristic thallic-arthric conidia were revealed; indeed, the powdery growth was composed in the main of disarticulated vegetative cells (Fig. 1F). In general, the thallic-arthric conidia of a whole range of Aphyllophorales and even Agaricales are morphologically very uniform, but the conidia in the Ilkley collection were immediately recognized by their bizarre shapes as those figured by Arnaud (1951) for his genus *Osteomorpha.*

Arnaud, although proposing new generic names for several intriguing anamorphic fungi, and giving many excellent illustrations, failed to provide Latin diagnoses. Thus, much less attention has been paid to Arnaud's work than it deserves, and of course his taxonomic suggestions are only partially usable because the names he proposed are invalid. Many of the fungi he described have not been collected again, although there is little doubt in our minds that at least some can be tied to basidiferous teleomorphs. For example, Arnaud's *Flahaultia hyalina* is identical to the anamorph of *Sebacina incrustans* (Pers. ex Fr.) Tul. figured by Brefeld (1888).

Most of Arnaud's collections have been lost or destroyed, so although we are basing our conclusions on a collection other than that originally described by him, we believe that we will be performing a service if, using the excellent Yorkshire material, we validate the generic name *Osteomorpha.*

Osteomorpha fragilis [Arnaud] ex Watling & Kendrick gen. et sp. nov.

Fungi Imperfecti, Hyphomycetes

Conidiomata compacta, pulvinate, farinacea, ad 1 mm diam., alba vel cremea, bubalinescentia in aetate, isolata vel dispersa in paginis basidiomatorum *Trechisporae farinaceae.*

Conidiophora inconspicua si adsunt, 1–2.5 μm lat., ad 5 μm long., raro longiora, hyphae vegetativae similia.

Conidia thallica, arthrica, composita per disarticulationem hypharum arcte septatarum, fibulatarum, caespitosarum, ex hyphis vegetativis oriundarum; 2–3.5 (–5) × 1.5–2.5 μm; fibulae persistentes in una vel utraque extremitate conidiorum, tumores angulares et conspicuos formantes.

HABITAT: in paginis *Trechisporae farinaceae*, in ligno putrido *Quercus*, Stubham Wood,

Ilkley, Yorkshire, England, 15.v.1977, leg. R. Watling (Holotypus: Wat. 12048 (E): Isotypus: WAT(ERLOO) 1001.

Conidiomata compact, pulvinate, powdery or farinaceous, up to 1 mm across, white to cream-colour, darkening to pale buff with age, isolated or sometimes scattered over the surface of the basidiome of *Trechispora farinacea. Conidiophores*, if present, reduced, 1–2.5 μm broad and up to 5 μm long, rarely longer, in all ways resembling the vegetative hyphae. *Ameroconidia* thallic-arthric, formed by the disarticulation of closely septate, clamped, fertile branches which originate in groups from vegetative hyphae, 2–3.5 (–5) × 1.5–2.5 μm, part clamp-connections remaining as conspicuous angular swellings at one or both ends of the cell, and often giving them the 'finger-bone' shape that prompted Arnaud's choice of generic name.

On the basidiome of *Trechispora farinaceae*, on rotten wood of *Quercus*, Stubham Wood, Ilkley, Yorkshire, England. Holotype in E. (Wat. 12048) Isotype in WAT.

Both Joost Stalpers and John Eriksson (pers. comm.) both appear to have found this same fungus. Stalpers' collection from Bergen (Netherlands) was considered by the late M. A. Donk to be *T. farinacea* in agreement with our findings. J. Eriksson has, however, been acquainted with this arthroconidial fungus for about thirty years "having seen it many times in my own and other collections". He too has found it with *T. farinacea* of which he considers it undoubtedly a conidial state. Unfortunately *T. farinacea* is a very difficult taxonomic problem, the name apparently having been applied in the past to collections covering a wide range of macromorphology e.g., size and density of aculei, and microcharacters e.g., spore size and ornamentation. It is probably a complex of species from which a nomenclatural type must be chosen in the future to stabilise the taxonomy. It is possible that the taxon growing on coniferous wood is what Fries had in mind when he described *Hydnum farinaceum*. This differs from the collection described above in larger aculei and basidiospores. However, until Professor Eriksson has carried out his investigations on the sexual state we refer the collection on oak from Ilkley to *T. farinacea* as outlined by Liberta (1973).

Unfortunately, direct hyphal connection could not be demonstrated between the *Trechispora* and *Osteomorpha*, so it has not been possible to prove whether the latter is the anamorph of the former, a parasymbiont, or even a weak parasite fruiting on the Basidiomycete. However, comparison of the hyphae found solely in the areas with typical hymenial elements (Fig. 1, J & K) including basidia, with those intermixed with the thallic arthroconidia showed similarities in size, and no indication of the presence of two very different fungi. This was supported by observations on the hyphae giving rise to the short conidiophores in the *Osteomorpha* (Fig. 1, A–C).These hyphae of the *Trechispora* were clamped, and 1–2.5 μm broad (Fig. 1, L) in agreement with those of the *Osteomorpha* (1–2 (–2.5) μm; Fig. 1, D). There were unfortunately no distinguishing features such as encrusting crystals, diverticulae, etc., to help in this comparison, but it is certainly pertinent to note that Liberta (1973) described similar arthroconidia for *T. farinacea*, as being 'sometimes present, formed by the segmentation of the hyphae in the pulvinate sectors, irregularly shaped, the ends truncate 4–8 × 2.5–4.5 μm, wall smooth, thin to slightly thickened (0.5 μm), hyaline.' The measurements of the Yorkshire material are at the low end of the size range given by Liberta, but his illustration agrees exactly (Fig. 1, F).

The *Trechispora farinacea*, with non-amyloid, hyaline, ovoid to ovoid-ellipsoid basidiospores with slight flattening in profile and echinulate, thin walls, also agrees with Liberta's

---

Legend to Fig. 1 A.–H. (opposite).

Osteomorpha fragilis: A, B, and C, Conidiophores bearing thallic arthrospores. D, vegetative hyphae. E, 4 chains of arthrospores. F, detached arthrospores (uppermost possibly germinating — arrow); outline of protoplast in cotton blue indicated. G, Arthrospores apparently differentiating; outline of protoplast in cotton blue indicated (position of possible new wall indicated and complex pore-structure accentuated by cotton blue). H, Section through edge of pulvinate fruit-body. I-L. *Trechispora farinacea*: I, Basidiospores. J, Mature basidia. K, Hymenial elements; basidioles and single poorly differentiated cystidium. L, Vegetative hyphae.


10 µm
A
B
C
D
E
F
F′
G
H
I
J
K
L

description of the suspected telemorph; the basidiospores measured 3–4 × 2.5–3 μm (Fig. 1, I). Unfortunately, attempts to isolate the *Trechispora*, from basidiospores and tissue, and the *Osteomorpha* from arthroconidia and hyphae, were unsuccessful. Apparently Liberta (1973) who gave a modern description of *T. farinacea* also did not obtain a pure culture of his fungus.

Similar arthroconidia have been found in *Collybia racemosa* (Pers. ex Fr.) Quél. (Watling & Kendrick, 1977), and *Pleurotus cystidiosus* O. K. Miller (Miller, 1969; Moore, 1976); obviously *Arthrosporella ditopa* (Singer) Singer (Singer, 1975) also produces arthroconidia, but the author did not indicate whether they were dicaryotic or monocaryotic. These three fungi are members of the Agaricales, but similar 'beaked' arthroconidia are found in species of *Amylostereum (Aphyllophorales)* associated with *Sirex noctilio* (Talbot, 1964).

Arthroconidia of *Collybia racemosa* have not been cultured, but because of the presence of clamp-connections it is assumed the cells are dicaryotic. Because of the presence of clamp-connections between adjacent cells in the chains (Fig. 1, E) of arthroconidia of *Osteomorpha*, these conidia are also considered dicaryotic; cytological observations give a varied and confused picture. *Pleurotus cystidiosus* has, however, been cultured (Kaufert, 1933; Miller and Pollack, 1976) and both monocaryotic and dicaryotic arthroconidia have been shown to be formed.

All three agarics produce their conidial anamorph in nature, although *P. cystidiosus* does it in the absence of the basidiome; *Amylostereum* produces such cells only in the hypopleural sacs of *Sirex noctilio.* If grown in culture on agar the cells of the same species-isolate are much narrower, more regular in shape, and lack clamp-connections at the transverse septa. It is unlikely, therefore, that the Yorkshire collection is a parasymbiotic anamorph of an *Amylostereum* sp.; this would be supported by host preferences known for *Amylostereum* spp., but not exhibited in the material described above.

The arthoconidia from *Sirex* bud-off secondary, globose to ellipsoid blastospores; of this there is only slight evidence in *Osteomorpha* (Fig. 1, F).

In *Collybia racemosa* and *Pleurotus cystidiosus* the arthroconidia are formed in coremioid heads, but it is suggested that the pulvinate sectors in the *Osteomorpha*, because of similarities in structure between it and *C. racemosa*, may be equivalent to astipitate coremia (Fig. 1, H).

Dr. Egon Horak recently sent a collection of this same fungus from Switzerland (on *Alnus*, partially covering *Hymenochaete* sp. GR. Schuls-Tarasp, 2.IX.1978, Horak 78/111).

ACKNOWLEDGMENT

We thank Dr. S. B. P. Haag of the Department of Classics and Romance Languages, University of Waterloo, for kindly correcting our Latin description, and Joost Stalpers, Centraalbureau voor schimmelcultures, Baarn, Netherlands and John Eriksson, University of Göteborg, Sweden for their very helpful comments.

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AN ESTIMATE OF THE NUMBER OF RED GROUSE IN THE PEAK DISTRICT

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In an earlier paper (Yalden, 1972), the distribution in the Peak District of the red grouse (*Lagopus lagopus scoticus* Latham) was recorded, but an assessment of their numbers was not considered practicable. However, P. Shooter *(pers. comm.)* has suggested that we ought to have estimates of the county populations for all those species (of which the red grouse is one) that reach a south-easterly limit to their distribution in Derbyshire. The fact that broad estimates have been attempted for national populations (Sharrock, 1976) has prompted this estimate of the Peak District population of the red grouse.

Methods

The area has not been resurveyed; the basic distribution used here is that previously recorded (Yalden, 1972), with a few records from additional squares added. There is a possibility that the species has disappeared since 1972 from a few squares, and that the map (fig. 1) slightly overstates the distribution in 1977.

Grouse seen were counted, but because the survey was carried out throughout the year, counts from different squares could not be compared directly. Autumn counts would be inflated by young birds, when compared with spring counts, while early summer counts would overlook sitting hens. "Corrected counts" were therefore used to indicate status (fig. 1); autumn counts were divided by three (on the assumption that each adult in autumn is accompanied by two young birds) while early summer counts were multiplied by two (assuming a sitting hen for each cock seen).

In a few squares, traces (droppings or feathers) were recorded, but no birds were seen. The corrected counts are presented on fig. 1 and in table 1 in five rough categories, which might be regarded as "traces", "scarce", "common", "numerous" and "abundant".

Results

Grouse were seen in 503 one-kilometre square, and traces were found in a further 22 squares, for a total of 525 squares.

In order to estimate the population, these categories of status require converting to densities. At one extreme, it seems unlikely that squares in which only traces were found had more than 2 pairs of breeding grouse each, on average. At the other extreme, Watson & Miller (1971) recorded on their study areas pairs with territories as small as 0.3 ha and as large as 13.2 ha. These figures imply extreme values of 333 and 7.5 pairs per 1 × 1 km grid

Table 1 The number of 1 × 1 km grid squares in the Peak District containing red grouse *Lagopus lagopus* at different levels of abundance. Surveyed 1969-1972, presented in 1972 counties.

	Derby	Yorks.	Cheshire	Staffs.	Lancs.	Total
Traces	12	9	—	1	—	22
1-4	113	90	39	20	4	266
5-9	62	40	12	9	3	126
10-19	54	26	7	10	1	98
20+	7	4	—	2	—	13
Total	248	169	58	42	8	525

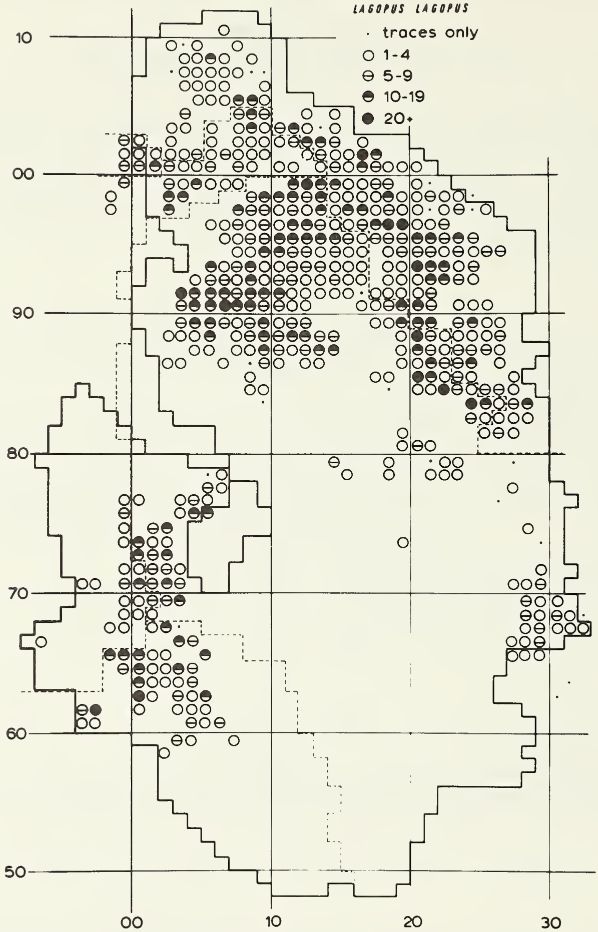

Figure 1. Distribution and status of red grouse *(Lagopus lagopus)* in the Peak District, recorded within 1 × 1 km grid squares. Heavy outline = boundary of the Peak District National Park; graticule = 10 × 10 km squares of the National Grid; dashed lines = county boundaries (pre-1974).

Table 2 Estimates of the red grouse *(Lagopus lagopus)* population in the Peak District, 1969-1972.

Status of Grouse	Assumed Population	Derby	Yorks.	Cheshire	Staffs.	Lancs.	Total
traces	2 (pairs)	24	18	—	2	–	44
1-4	5	565	450	195	100	20	1330
5-9	20	1240	800	240	180	60	2520
10-19	50	2700	1300	350	500	50	4900
20+	100	700	400	—	200	—	1300
Total (pairs)		5229	2968	785	982	130	10094
August Population (pairs × 6)		31374	17808	4710	5892	780	60564

square. However, their study populations had on average territories of about 1.5 ha in good years and 4 ha in poorer years, that is from 75 pairs to 25 pairs per one-kilometre square. I have therefore assumed 100 pairs for each of the 13 squares in the highest category, 50, 20, and 5 pairs for each of the lower categories. These assumptions also imply that I saw about 20% of the grouse, at least in the better squares, which seems reasonable.

On this basis, there are (table 2) about 10,000 pairs of red grouse in the Peak District; over 5,000 of them are in the old Derbyshire, and the acquisition of Longdendale would result in a further 600 pairs being assigned to the new Derbyshire. In a reasonable breeding year, each pair produce on average four flying young by August (i.e. two young per adult); in very good years there may be six young per pair, but in poor breeding years only one young per pair (Jenkins *et al.*, 1967). On this basis, a reasonable estimate of the August population is given by multiplying by six the estimates in table 2. This suggests a population of around 60,000 birds at the start of the shooting season.

It also suggests a way of roughly checking all the assumptions made. Given a fairly stable population, the game bag on a heavily shot moor cannot be more than 66% of the August population; if some birds are to die from other mortality agents (predators, starvation, accidents, disease, territorial displacement), 50% is a more likely proportion. Making the same assumptions as above to areas for which game bags are available (table 3), it seems that

Table 3 Estimates of the red grouse population for three moorland areas where game bags are available for comparison.

Status of squares	Area 1 squares	Area 1 population	Area 2 squares	Area 2 population	Area 3 squares	Area 3 population
1-4	17	85	5	25	4	20
5-9	5	100	5	100	4	80
10-19	6	300	9	450	1	50
20+	—	—	2	200	—	—
Total (pairs)		485		775		150
August population (birds)		2910		4650		900
Game bags		566 (1971)		2064 (1968)		420 (1972)
Game bag as % estimated August population		19		44		47

the poorer areas have perhaps fewer grouse than calculated, but that the estimates are reasonable for better areas, and are overall at least of the correct order of magnitude.

The results can also be used to estimate the national population. The Peak District population occurs in twenty-one 10 × 10 km grid squares, with, on average, 480 pairs per 10 × 10 km square. Applying this average to the 1,300 squares in which breeding occurred or probably occurred (Sharrock, 1976) suggests a national population of 620 thousand pairs, rather higher than the "under half a million" suggested in the *Atlas*.

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Lichen Ecology edited by **M. R. D. Seaward.** Pp. x + 550 with numerous illustrations, Academic Press. 1977. £23.00.

One of Dr. Seaward's main aims in the production of this volume has been to establish the necessity for the interdisciplinary approach in lichen-ecological studies. The substrate and the physicochemical environment, the macro- and microclimatic conditions, the interrelationships both within lichen communities and with other plant and animal communities and the nature and effects of any anthropogenic influences must all be comprehended if a sound appreciation of the role of lichens in ecosystems is to be achieved. The opening chapter succinctly sets forward these and other editorial ends and means.

The basic format of each subsequent chapter is an overall evaluative review of work to date on some major aspect of lichen ecology, coupled with distinguished original contributions and a comprehensive bibliography. Weber considers lichen morphological-environmental relations, Topham the processes of lichen colonization, establishment and succession. Gerson and Seaward examine lichen-invertebrate associations, Richardson and Young those of lichens and vertebrates. Ahti contributes a detailed study of the extremely homogeneous flora of the boreal coniferous zone, Lindsay surveys the arctic and antarctic polar floras and Rogers discusses hot arid and semi-arid regions. Brightman and Seaward's chapter on lichens on man-made substrates covers the gamut of such habitats from the most commonly available to such mavericks as the "uncivil glass" of wall-tops, old French cannon and abandoned motor-cars. James, Hawksworth and Rose provide a profound treatment of British lichen communities. Despite the authors' modestly disclaiming description of "A preliminary conspectus", this chapter is a model for similar phytosociological work elsewhere and must surely become a basic text. Manifesting the enviable depth and range of the authors' field experience, it will also serve as a field manual for workers compiling localized species lists. Gilbert's assessment of lichen conservation in Britain and his suggestions for a future strategy close the main body of the book.

In Appendix A Hawksworth proffers a well-wrought bibliography of world lichen floras under international, continental and national headings. Appendix B is a selected glossary by Seaward and Hawksworth to the present text and to lichenological literature in general.

The editor and his contributors have made available a wealth of lichen-ecological information, a rich fund of ideas for ecologists, lichenologists, earth-scientists, biogeographers and workers in allied fields. The book has unexpected dividends in store for any such specialist.

A.H.

DACTYLORHIZA TRAUNSTEINERI IN YORKSHIRE

D. J. TENNANT

Under the name *Orchis latifolia* var. *eborensis*, Godfery (1933) described a marsh orchid previously unrecognised in this country. The type locality for this was Helmsley, N.E. Yorkshire, but specimens from two stations in Co. Durham were referred to the same variety. Three years later Pugsley (1936) described *O. majalis* subsp. *Traunsteinerioides* from Co. Wicklow, adding that "some specimens from Yorkshire referred to *O. latifolia* var. *eborensis* Godf. are also not unlike it." This latter statement referred to the Helmsley plants, and to plants seen by him in Upper Wharfedale in 1920 (Pugsley, 1935). In 1937 Pugsley was shown a colony of similar marsh orchids at Hellifield, Mid-West Yorkshire, by Dr. W. A. Sledge. He subsequently decided to place Godfery's var. *eborensis* under his subsp. *Traunsteinerioides* (Pugsley, 1939), and later raised this to *Orchis traunsteinerioides* (Pugsley, 1940). Although these plants were known to be similar to the Continental species now named as *Dactylorhiza traunsteineri* (Sauter) Soó, this Orchid remained unrecorded in the British Isles until 1949.

Four years later, J. Heslop-Harrison (1953), after examination of herbarium material, suggested that some of the above mentioned sites seemed to be localities for this species, but that further field investigation was needed. Following such field studies Roberts and Gilbert (1963) confirmed that the Hellifield orchids, and others from Rievaulx, were beyond doubt *D. traunsteineri*.

The Narrow-leaved Marsh Orchid, with which the Yorkshire plants were now united, had however been found in Yorkshire much earlier. The earliest gathering appears to be one by Dr. F. A. Lees from Carperby, Wensleydale in 1885, cited as *Orchis eu-latifolia* **(BM).** Other early Yorkshire records or sightings were from Masham (A. B. Sampson 1893), Tanfield (T. J. Foggitt 1906), Helmsley (T. J. Foggitt 1905 and 1922), Rievaulx (T. J. Foggitt 1937), Hellifield (W. A. Sledge 1930) and Upper Wharfedale (P. M. Hall and W. A. Sledge 1934). The only additional Yorkshire record since that period is a further site in Upper Wharfedale, V.C. 64, found by me in 1974. However, the orchid is certainly still present in most, if not all, of the original sites, although no definite specimens from Durham seem to have been traced.

Descriptions of the earlier records indicate that in general the number of plants appears to be decreasing, and many of the sites listed above have shown only a handful of plants in recent years; as no obvious changes in the majority of sites would seem to account for this decline, it must be assumed that climatic factors are partially responsible.

In spite of the distinctive characters of *D. traunsteineri*, at least when in typical form, it is suspected that the orchid may have been overlooked in Yorkshire, and possibly elsewhere. If this is the case it has perhaps been mistaken for *Dactylorhiza purpurella* (T. & T. A. Stephenson) Soó, in the majority of instances. It is less likely to be confused with *D. incarnata* (L.) Soó, although its subsp. *pulchella* (Druce) Soó has been occasionally mistaken for *D. traunsteineri*.

The only other Dactylorchids which could possibly be confused with *D. traunsteineri* in Britain, excluding certain hybrids, are *Dactylorhiza praetermissa* (Druce) Soó and *D. majalis* (Reichb.) P. F. Hunt & Summerh., although both of these have clearly separable characters, and neither is recorded from the areas of Yorkshire where *D. traunsteineri* grows.

An attempt has therefore been made to describe the easily recognisable characters which will separate *D. traunsteineri* from *D. purpurella* in Yorkshire and probably elsewhere. These descriptions are based on those of Roberts (1961 and pers. comm.) and Roberts and Gilbert (1963), with additional field observations made in Yorkshire by the author. There is certainly a close similarity between the flowers of the form of *D. purpurella* which T. and T. A. Stephenson originally described as *Form B*, with a rounded, barely trilobed labellum (see

illustration), and certain robust forms of *D. traunsteineri* although, as will be seen below, other characters may be used which will usually separate the two plants.

The geographical isolation of sites probably explains the variation which is seen even between the individual Yorkshire colonies and may be an additional factor in the reduction of vigour among the smaller colonies, as has already been suggested by Roberts and Gilbert (1963).

Description of *D. traunsteineri*

Stature

The stature is very variable, typically small and slender, but the height can be from 5 cm. to over 30 cm. Size varies considerably between different colonies, but it is also appreciably affected by the density and the height of the surrounding vegetation, altitude and exposure. The stem is almost solid.

Leaves

Leaf width is an important character, averaging 1.0–1.2 cm., or less, according to colony, and very rarely reaching 1.8 cm. Leaf spotting is either absent or light in the form of small dot-like spots, indistinct broken rings, or transverse bar-markings sometimes confined to the upper part of the leaf. The number of leaves varies from two to five, average three or four, spreading and often channelled, rigid and recurved. Non-sheathing leaves nought to one. Leaf colour is usually medium green. Leaves are broadly hooded or flat at the tip.

Floral Characters

The spike is ± somewhat one-sided and usually few-flowered, the number of flowers varying from 3 to 18, average 9–11. The individual flowers are sometimes largish and usually widely spaced with ovary ± arching giving a somewhat lax appearance to the flowers. The bracts are ± uniformly and deeply coloured magenta-brown or magenta-purple (the upper stem even below the lowest bract and the non-sheathing leaf are also often tinged strongly with a similar colour). The characteristic deltoid labellum is by no means typical in all Yorkshire colonies (see illustrations) and the lateral lobes of the labellum are invariably somewhat reflexed. The lateral sepals are held high and sometimes recurved at their tips. The spur is long and usually robust, ± straight below, not conical and not strongly curved or sharply pointed (see illustration). The flower colour is usually dull magenta-purple or intense very deep magenta (almost as deep as *D. purpurella*) or sometimes bright magenta-pink.

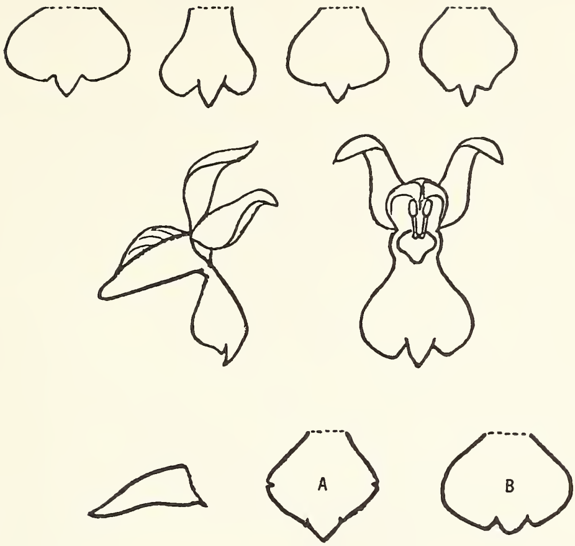
The most useful characters, especially in the case of difficult plants, are leaf width, leaf number (including non-sheathing leaves), coloration of the upper stem and bracts, and shape and size of the spur.

Comparative Description of *D. Purpurella*

The leaves average 1.5–2.0 cm. in width, or more. The number on average is 5 to 7, and non-sheathing leaves 1 to 2, and the leaves are usually not quite so rigid. Leaf spotting is typically in the form of dot-like spots in the upper half of the leaf; larger, barred, or ring-like spots very rarely occur, except in hybrids.

The flowers are not so widely spaced, i.e. the spike is more dense, and also ± flat-topped in appearance. The number of flowers averages over 15 (typically at least 20) and the individual flowers are not lax. The bracts are sometimes purplish-tinged but usually predominantly greenish, the upper stem just below the lowest bract is invariably green. The labellum is more or less flat and is usually less distinctly three-lobed, typically diamond-shaped but sometimes rounded (illustrations A and B), the central lobe being smaller than that of *D. traunsteineri* in most cases. The spur is generally somewhat shorter and less robust, slightly curved and conical (seee illustration).

The subsp. *pulchella* of *D. incarnata* which can have similarly coloured flowers, bracts and upper stem to *D. traunsteineri* may be most readily distinguished by the leaves which are usually erect, paler or yellowish-green, invariably unspotted and often narrowly hooded at their tips. (NOTE: Plants with minute spots on the leaves have been seen by R. H. Roberts



(1) *D. traunsteineri*, labella shapes.
(2) *D. traunsteineri*, flower showing spur.
(3) *D. purpurella*, labella shapes and spur.

near Malham, although leaf-spotting is extremely rare.) The stem is usually robust and very hollow, although slender forms do occur. The spike is compact, the flowers are not lax. The labellum is narrow, scarcely tri-lobed and very strongly reflexed laterally with characteristic loop-markings. The spur is markedly conical and curved.

Hybrids of *D. Traunsteineri*

D. fuchsii (Druce) Soó X *D. traunsteineri* is recorded from Helmsley, the same hybrid is recorded in Upper Wharfedale (Tennant, 1974), and probably occurs at some of the other Yorkshire sites. *D. maculata* (L.) Soó subsp. *ericetorum* X *D. traunsteineri* which is recorded from Anglesey and Caernarvon has not been recorded in England, although a plant which may be of this parentage has been seen in Upper Wharfedale by the author. These hybrids tend to be intermediate between the two parents.

No other hybrids involving *D. traunsteineri* have been recorded in Northern England, although *D. incarnata* X *D. traunsteineri* has recently been reported from Anglesey. (Roberts, pers. comm.). It is interesting that no hybrids between *D. purpurella* and *D. traunsteineri* have been found even in Anglesey where the two plants often occur together. There are, however, other hybrids not involving *D. traunsteineri* which do occur in Northern England and which may bear some resemblance to this plant, notably *D. incarnata* X *D. purpurella* although the characters discussed above together with pollen examination will often distinguish such plants from *D. traunsteineri.*

Flowering Period

D. traunsteineri is the earliest marsh orchid to flower in Britain, normally coming into flower in Yorkshire at the end of May, although in late seasons and at higher altitudes it may not commence flowering until after the first week in June, and flowering may continue well into July. *D. incarnata* usually commences flowering within a week of *D. traunsteineri* whereas

D. purpurella is rarely in flower in the Yorkshire Dales before the end of the first week of June, a fact which in itself is a useful clue to the presence or absence of *D. traunsteineri*.

Habitat

It is worthwhile elaborating on the habitat of *D. traunsteineri* as the orchid does seem to be very exacting in this respect. The plant in Yorkshire grows at altitudes from 250 to 1250 feet, invariably in or near hill country and often at no great distance from a major river. The plant grows in open marshes which are strongly flushed with calcareous ground water. The sites are very often close to natural springs, often with rich deposits of tufa close to the surface, giving a typical pH reaction at tuber level of 7.0–7.5.

Some of the more interesting or noticeable plants which are nearly always present in such sites in vice counties 64 and 65 include: *Selaginella selaginoides*, *Trollius europaeus*, *Parnassia palustris*, *Primula farinosa*, *Pedicularis palustris*, *Pinguicula vulgaris*, *Valeriana dioica*, *Dactylorhiza fuchsii*, *D. incarnata*, *Eriophorum latifolium*, *Carex hostiana*, *C. dioica* and certain mosses, notably *Ctenidium molluscum*.

Similar communities are however also to be found in many calcareous marshes elsewhere in the Yorkshire Dales, for example near Malham Tarn and in Upper Teesdale, but it may be significant that in the latter two areas *D. traunsteineri* has not been recorded. This is in spite of the apparently suitable and much larger habitats, whilst at the same time certain other plants which are invariably closely associated with the orchid are also absent, these include: *Epipactis palustris*, *Juncus subnodulosus*, *Schoenus nigricans* and certain *Chara* sp. *Ophrys insectifera* could probably also be added to this group as it does surprisingly occur in a few identical habitats in Yorkshire, and grows with *D. traunsteineri* in such places in Eire, Anglesey and on the Continent, although it has not yet been seen in any of the Yorkshire sites where the latter is recorded. Curiously, *D. purpurella* appears to be absent from all the sites for *D. traunsteineri* which the author has seen in Yorkshire, although it does occasionally occur in the correct type of habitat and is recorded as growing near *D. traunsteineri* in several localities in Anglesey. It would be interesting to compare the more widespread plants listed with those from *D. traunsteineri* sites in other areas in order to determine the significance of these factors. However, it certainly does appear to be significant that *D. traunsteineri* is invariably closely associated with *Schoenus nigricans* at least, a fact which has already been well described by other authors.

Finally, it is hoped that the significant distinguishing characters which have been described above for *D. traunsteineri*, its distinction from other marsh orchids, and details of the typical habitat, will lead to the discovery of further sites in Yorkshire or elsewhere in the British Isles.

Acknowledgements

I should like to express my thanks to Mr. R. H. Roberts of Bangor and to Dr. W. A. Sledge for their invaluable assistance with this paper.

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(N.B. The more recent nomenclature for Dactylorchids adopted by Sundermann and proposed for *Flora Europaea* has not been used in this paper.)

FOOTNOTE

Since this paper was written the author has discovered the two hybrids *D. incarnata* × *D. traunsteineri* and *D. maculata* subsp. *ericetorum* × *D. traunsteineri* in Yorkshire; both are first records for England.

Y.N.U. BRYOLOGICAL SECTION: ANNUAL REPORT 1978

T. L. BLOCKEEL

The year has seen the sad loss to the section of the late Mary Dalby. She gave an immense amount of her time as recorder to the bryological section and undertook the tedious task of rewriting all the Yorkshire moss records into new ledgers. Her knowledge of local mosses, and especially of the genus *Sphagnum*, will be greatly missed.

The year has also seen the publication of the long-awaited new British *Moss Flora* (Smith, 1978). Certain groups, including *Bryum bicolor* agg. and *Pohlia annotina* agg. will need re-recording in view of their revised taxonomy, and the Flora exhibits much new nomenclature, which is adopted in this report.

Sectional meetings have been held at Broughton on 15th April, to examine an under-recorded part of V.C. 63, and at Ripon (V.C. 64) on 9th–10th September, for visits to Picking Gill and the banks of the R. Laver.

RECORDS

There are three outstanding records:

Lophozia perssonii: V.C. 63*: 43/58 on ruins of Roche Abbey, TLB, Nov. 1977; 44/51 a few stems on disturbed ground, Brockadale Woods, TLB, Dec. 1977. This is only the third British vice-county for this rare hepatic; it resembles *L. excisa*, and in view of the possibility that *L. perssonii* is an introduced species, it would be interesting to know whether the old record of *L. excisa* at Roche Abbey is correct.

Marchesinia mackaii: V.C. 63*: 43/58 Anston Stones Wood, TLB, May 1978. The locality, on the magnesian limestone, represents a notable extension of range for this Atlantic species in Britain. The nearest sites are the Dovedale area of Derbyshire and the Ingleton glens of mid-west Yorkshire, and most of its British localities are on or near the western seaboard. Its occurrence east of the Pennines is therefore quite unexpected. It is confined at Anston Stones Wood to a small area of the low, north-facing cliff which runs parallel to the Anston Beck. The only other Yorkshire records are those from the Ingleton area.

Schistidium agassizii: V.C. 65:* 35/92, Low Force, Holwick, Teesdale, TLB, Aug. 1978. First recorded from the Tees by Holmes (1976), but published records have referred only to Durham (V.C. 66); it is now confirmed for the Yorkshire side of the river. Like other rarities of Teesdale, *S. agassizii* is known elsewhere in Britain only from Ben Lawers. In the Tees it is usually submerged, and this presumably explains its late discovery there.

Other interesting records are as follows. Those made during Y.N.U. meetings, with the exception of vice-county records, are not given here, since they are to be reported elsewhere.
Riccia glauca: (63*) 44/50 arable field, Warmsworth, Doncaster, TLB, Dec. 1977.
Ricciocarpus natans: (63) 44/51 Balne Ponds, TLB, June 1978.

Metzgeria temperata: Paton (1977) discusses this segregate from *M. fruticulosa.* Old records of the latter can be treated only in an aggregate sense unless accompanied by a voucher. Paton confirms *M. fruticulosa* s.s. from V.C. 61 & 65. Records of *M. temperata* are: (64*) Ingleton, F. E. Milsom, 1931; (65*) Below Needle House, Uldale, G. Halliday, 1964.

Moerckia flotowiana: (63) Rediscovered at H. Walsh's locality, 44/03 Ogden Clough, Halifax, TLB, Oct. 1977.

Calypogeia neesiana var. *neesiana:* to be deleted for 63 & 64 (Paton 1977b).

C. neesiana var *meylanii:* (63*) Grit rocks, Widdup, A. Turner, 1936; (64*) Bolton Woods.

Leiocolea muelleri: (63) 44/41 Magnesian limestone boulder, Brockadale, TLB, Sept. 1975.

Plectocolea paroica: (63) 34/93 Hardcastle Crags, TLB, May, 1978.

Nardia geoscyphus: (63) 44/03 Peaty bank, Denholme, TBL, Nov. 1977; 34/93 Bank by track near Ponden Reservoir, TLB, May 1978.

Scapania aspera: (63*) 43/58 Magnesian limestone boulder, Anston Stones Wood, TLB, May 1978.

Scapania aequiloba: Long (1978) notes that many records of this species are misidentifications of *S. aspera.* He confirms the following vice-county records: (64) Wharfedale, Spruce, 1841; (65) Below Winch Bridge, Spruce, 1843.

Lejeunea lamacerina: (63*) 34/93 Hardcastle Crags, TLB, Dec. 1977.

Lejeunea cavifolia: (63*) 34/93 Hardcastle Crags, outcrop of calcareous grit, TLB, Oct. 1977.

Cololejeunea calcarea: (63*) Hardcasle Crags, outcrop of calcareous grit, TLB, Oct. 1977.

Cololejeunea rossettiana: (63*) 43/58 Anston Stones Wood, with *Marchesinia*, TLB, May 1978 — previously reported by F. W. Adams and C. D. Pigott (Walsh 1953) but not in Census Catalogue.

Frullania tamarisci: (63) 43/19 Boulders, Abbey Brook, Upper Derwent Valley, TLB, Nov. 1976 — apparently the only recent record for the genus and species in V.C. 63.

Andreaea crassinervia: (63*) 34/93 Hebden Valley (conf. M. O. Hill), TLB., Oct. 1977.

Ditrichum cylindricum: (63*) 44/03 Bank of stream, Denholme, TLB, Nov. 1977; (64) Flower bed, Golden Acre Park, Adel, Leeds, TLB, Aug. 1978. A much under-recorded species.

Distichium capillaceum: (63) 43/58 Magnesian limestone, Anston Stones Wood, TLB, May 1978.

Seligeria doniana: (63) 34/93 Crimsworth Dean, TLB, Sept. 1977.

Dicranella staphylina: (61*) 44/82 Moist meadow south of Newport, TLB, YNU exc., June 1978.

Dicranum tauricum: (64) 44/54 Askham Bog, JR, 1978.

Dicranum fuscescens: (63) 43/29 Agden Dyke, TLB, Apr. 1978.

Hyophila stanfordensis: (63) 44/50 Levitt Hagg, Warmsworth, TLB, Dec. 1977; 44/40 S.E. of Hickleton, TLB, Dec. 1977.

Tortula ruralis: (63) 43/59 Asbestos roof, Sandbeck hall, TLB, July 1977 — first record this century.

Barbula acuta: (63) 43/58 Old quarry, Lindrick Common, TLB, Feb. 1977; 44/51 Brockadale, TLB, Apr. 1977.

Weissia rutilans: (63*) 44/50 Edge of ride, Melton Wood, TLB, Feb. 1977.

Ephemerum serratum var. *minutissimum:* (63) 44/30 In pastures by Worsbrough Reservoir. TLB, Dec. 1977.

Pohlia annotina agg.: The current treatment of this group (Lewis & Smith, 1978) requires revision of earlier records. *P. bulbifera* stands as previously; *P. annotina* and *P. proligera* are united under the latter name; records for *P. rothii* are to be considered *P. drummondii*, true *P. rothii* being very rare in Britain. One taxon new to Yorkshire is *P. camptotrachela*. The following are vice-county records.

P. bulbifera: (63*) 34/93 Wet peaty track, Crimsworth Dean, TLB, Sept. 1977.

P. camptotrachela: (63*) Queensferry Station, J. Appleyard; (65*) Balders head, Balder Dale, J. A. Paton, 1968.

Bryum algovicum var. *rutheanum:* (63) 34/84 Canal edge near Barnoldswick, TLB, Jan. 1978; 43/58 Lindrick Dale, old quarry, TLB, May 1978.

Bryum flaccidum: (61*) 44/93 Brantinghamdale, 44/92 Weltondale, TLB, YNU exc., Sept. 1977.

Bryum capillare var. *rufifolium:* (63*) Bridge, Upper Derwent Valley, TLB, May 1977.

Bryum microerythrocarpum: (63*) Foulstone near Strines, TLB, Feb. 1977.

Bryum violaceum: (63*) 44/82 Arable field, Whitgift, TLB, Dec. 1977; (64*) 44/43 Side of track, Newthorpe Quarry, Micklefield, TLB, Sept. 1977.

Bryum ruderale: (63*) 44/32 Arable field, Robin Hood, near Middleton, Leeds, TLB, Dec. 1977.

Bryum bicolor agg.: Four segregates are now recognised (Smith & Whitehouse, 1978).

B. bicolor s.s. is much the commonest, but *B. gemmiferum* and *B. gemmilucens* are also known from Yorkshire.

B. gemmiferum: (61*) Clay of slipped cliffs, Sewerby, Flamborough Head, E.R.B. Little, May 1968; (63*) 44/82 Ditch, Whitgift, TLB, Dec. 1977; (64*) River bank, Nunwick, J. Appleyard, June 1950.

B. gemmilucens: (62*) Waste ground, Ganthorpe, Spruce, Jan. 1845.

Bartramia ithyphylla: (62*) 45/61 On shale, Hutton Lowcross, TLB, YNU exc., June 1978; (63*) 34/93 Hardcastle Crags, TLB, Dec. 1977.

Orthotrichum sprucei: (65*) 34/99 Bainbridge, 34/98 Aysgarth, on trees by R. Ure, TLB, YNU exc., July 1978.

Orthotrichum affine: (63) 34/92 Wall top, Greenwood Lee, Hebden Valley, TLB, July 1977 — first record this century.

Amblystegium compactum: (63) 43/58 Anston Stones Wood and Lindrick Dale, TLB, May & June 1978.

Amblystegium humile: (64) 44/54 Askham Bog, JR, 1978.

Platydictya jungermannioides: (63*) 43/58 Anston Stones Wood, TLB, May 1978.

Orthothecium intricatum: (63*) 43/19 Abbey Brook, Upper Derwent Valley, TLB, Aug. 1977.

Isopterygium pulchellum: (63) 34/93 Hardcastle Crags, TLB, Dec. 1977 — last recorded in 1901.

An asterisk indicates a new vice-county record or amendment to the Census Catalogue. Recorders' initials: JR = Miss J. Robertson; TLB = T. L. Blockeel.

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CECIL RALPH HAXBY, F.R.E.S.
1913 — 1978

The death of Cecil Ralph Haxby, Chairman of the Lepidoptera Committee, on 17th December 1978 came as a great shock to his many friends. Despite a long and painful illness, he was looking forward to enjoying his hard earned retirement, which had only just begun in July 1978, and to increasing his activities in his favourite occupation of collecting and recording British Lepidoptera.

His knowledge of Yorkshire lepidoptera was second to none, and he rendered valuable service in the compilation of the new List of Yorkshire Lepidoptera. He was past President of the Bradford Naturalists' Society, and for over 25 years had been their recorder for Lepidoptera and Odonata. He had a wide circle of friends among British entomologists, and was a member of the British Entomological and Natural History Society, whose meetings he attended regularly for many years.

His important entomological collection, which is notable for its meticulous accuracy, and his detailed recording data are to be presented to the Bradford Metropolitan Natural Science Museum at Cliffe Castle, Keighley, thanks to his sister Mrs. Kathleen Slimming.

Cecil Haxby's father, Fred Haxby, was also a prominent member of the Y.N.U. in the early part of the century, specialising in botany (mainly bryology) and was a great friend of Chris Cheetham. It was in their company that Cecil acquired his great love of natural history.

He was also interested in music, and was a member of the Bradford Organists' Association. His working life was spent in the electrical supplies trade, becoming manager of the Leeds branch of Seimans Electric Supplies Ltd., until their merger with A.E.I. Cables Ltd., whose branch manager he became until retirement. He served with the R.A.F. Signals for the duration of the War, in South Africa and the Middle East.

The Y.N.U. has lost a valuable and conscientious worker, and many of us a very good friend.

J. Briggs

FREDA AND JOHN KEMSLEY

Y.N.U. members were very shocked and sad to hear of the tragic deaths of Mr. and Mrs. J. Kemsley in a mountaineering accident in bad weather in Italy on 30th August 1978.

Freda and John went to live in Doncaster in 1966. John was Head of the National Coal Board's Standardisation Department. Freda, a classics teacher who had also worked in publishing, was at the time of her death a part-time classics teacher at Hill House Preparatory School, Doncaster.

They were experienced mountaineers and members of Alpine Clubs. Their great love of the out-of-doors and natural history were shown in their active membership of the Y.N.U. and of the Doncaster Naturalists' Society from 1967 onwards. From 1968 until his death John continuously held one or other important office in the Doncaster Society, including a year as President. Freda had served as Programme Secretary and as Keeper of Botanical records, in which latter capacity she worked very hard for the Y.N.U. Flowering Plant Section by co-ordinating records from the Doncaster area. She was specially interested in British and foreign wild flowers, and in gardening.

Freda and John will be remembered particularly for their contribution to Y.N.U. Field Meetings when Freda was Divisional Secretary for V.C. 63 from 1970 to 1976. They worked as a splendid team, making the arrangements very thoroughly so that opportunity was given for all sections to record the area well. The enjoyment of those present was helped by the infectious enthusiasm they showed in all their activities, whilst John's vigilance ensured that nobody got lost. Whenever Freda and John were at a Y.N.U. meeting, outdoors or indoors, the occasion was the richer for their presence and they will be greatly missed by all who knew them.

Joan Duncan

CITY OF BRADFORD METROPOLITAN COUNCIL NATURAL SCIENCES COLLECTIONS: PART 2 — GEOLOGICAL

ALISON C. ARMSTRONG
Assistant Keeper, Natural Sciences (Geology),
City of Bradford Metropolitan Council Museums Services

Following Local Government re-organisation in 1974, the geological collections at Cartwright Memorial Hall (Bradford), Cliffe Castle (Keighley) and specimens at the Manor House (Ilkley) were united to form a reference collection for the City of Bradford Metropolitan Council Museum Service.

Most of the geological collections are now stored in one area at Cliffe Castle, where work is progressing on sorting, cataloguing (using IRGMA M.D.A. computer cards) and storing. Parts of the collections are still in boxes and tea chests, or otherwise rather inaccessible. This survey, therefore, is only as thorough as present conditions allow. Some of the collections listed (those asterisked) are only known from old accession books and may yet come to light.

The collections consist of material acquired by local scientific societies in the last century, and of individual collections acquired this century. All the collections have some local connection. There is some type and figured material.

The collections originating from the old Keighley Borough Museum (which became part of the Bradford Metropolitan District in 1974), consist of material from the Keighley Scientific and Literary Society (KSLS), a mass of "duplicate" minerals from the old Beaumont Park Museum in Huddersfield, and the large fossil collections of Charles Croft, James Spencer and (G?) Campbell. All these were acquired before 1910 and were uniformly relabelled at that time and the specimens glued on to blue, paper-backed glass. Fortunately the curator at that time (S. L. Mosley) did record details of the collections, although very few original labels survive from before this time.

Seth Lister Mosley was curator at Keighley's public museum from 1904–1910. He was formerly curator of his own museum in Huddersfield, and later became curator of the first public museum there as well as holding the curatorship at Keighley. According to Mosley's 1907 notebook, "16,230" specimens, including hundreds of minerals, were transferred to Keighley from his private museum. These included specimens from individual collections, such as those of C. S. Gregson of Liverpool and of H. Crowther. "Duplicate" specimens from Keighley were similarly transferred to Huddersfield's public museum. No details of these specimens are known. In 1908 Mosley wrote in his report on the Keighley Museum "I have been much harassed during the year in the endeavour to get all the loose material, which has come in, into order. The Campbell, Croft and Spencer collections have all been cleaned, remounted and labelled and also a very large number of fossils, minerals and marine shells from the late Beaumont Park Museum, in all not less than 10,000 specimens have been got out of the way".

The Croft Collection was acquired in 1907; [and] some more of his collection was acquired in 1910, and presumably the Campbell and Spencer collections came in about the same time. The thousands of fossils which make up these three collections come mainly from the classic British localities. Amongst Charles Croft's collection are some type and figured branchiopod specimens, illustrated in Thomas Davidson's monograph on brachiopods (1883–1885) in the Journal of the Palaeontographical Society. Croft had a successful literary career in Manchester and Shropshire, when he probably put together much of his collection, and then became editor of the "Keighley News" from 1891–1906.

Little is known about Campbell except that a few remaining original labels show he collected in the 1860's. J. Spencer was a Halifax man and connected with the museum there.

Table 1. The former Keighley Borough Geological Collections

Collector (biographical dates)	Source or method of acquisition (collection number)	Approximate number of specimens	Period of Collection	Collecting Area
Keighley Scientific and Literary Society (KSLS) (1881–1914)	Given to the Corporation between 1899 and 1914. Some probably sent to Huddersfield Museum. (5780–6781, 6807–6840, 523/14)	130 fossils and few rocks	Pre. c. 1900	Mostly English, Jurassic and Cretaceous areas.
E. T. Connold	Presented by G. H. Moncrieff. (Part of 6807–6840)	30 polished sections of fossil sponges in flint nodules.	c. 1899	Sussex coast
Beaumont Park Museum (BPM) (–c. 1900)	Transferred to Keighley Museum as 'duplicates' by S. L. Mosley	300 (possibly more) minerals with very little data	Pre. 1900	
S. Gregson (Pre. 1903)	Formerly part of BPM collection and also transferred to Keighley Museum	100 minerals with little data	Pre. 1903	
S. L. Mosley (1849–1929)	Donations 1904–1914 of 'duplicates' from his own collection at BPM (033–1904)	About 30 minerals	Pre. 1910	
H. Crowther	Formerly part of BPM collections and transferred to Keighley	20 Coal Measure fossils	Pre. 1913	Yorkshire
(G) Campbell	Gift c. 1906	40 stratigraphical rock samples 35 Minerals 380 Fossils (mostly Carboniferous, Silurian and Red Crag)	1860's, 1870's	Yorkshire and classic British localities
Charles Croft 1836–1914	Main collection acquired in 1907 More in 1910 (37–1910)	Over 4,000 fissils from most periods but largely Palaeozoic	1860's–c. 1900	Mostly Wales and Shropshire and classic localities. Also Bradford and Yorkshire.
J. Spencer	Acquired between 1904–1908	200 fossils mostly from the Silurian, Carboniferous, Jurassic and Cretaceous. A few microscope slides		

W. Gelders	No record	20 fossils, mostly Coal Measures	1880's, 1890's	Yorkshire
B. Southwell-Lees	Purchase 1904 (43/1904)	Minerals		N. England and Foreign (e.g. Bohemia)
*Burnley Literary and Philosophical Society	? Donation 1907, Miss Heaton	Fossils		Clitheroe
C. Bairstow	Donation 1907 (216/1907)	Minerals		No data
Moses Fieldhouse	Purchase c. 1910 (M. 313)	52 Microscope slides most petrological		
Dr. Wheelton Hind (1860–1920)	Donation from the British Museum 1923/4 (1924–950)	129 Carboniferous fossils		
James Ellison	Purchased in 1928 from Ilkley Museum (1145–7/1928, 8480)	2,000 fossils mostly Carboniferous, Jurassic and Cretaceous and Red Crag. A few minerals	Pre. 1891	Craven, Wales, Yorkshire, Isle of Wight, N. Pennine minerals
E. E. Gregory	Donation (072/1904)	Local glacial erratics		Keighley area
R. Boxhall	Donation 1934 (1935–1523, 1934–1454)	Minerals		Cornwall
John Holmes 1867–1945)	Main collection on loan in 1942 (3, 42, 4.42, 8.42, 12.41)	500 Carboniferous marine band and other fossils	1920's–1930's	Craven and Keighley areas, Yorkshire
Thomas Hodgson	Donation c. 1953	300 Petrological specimens		Northern England, Scotland, a few foreign
Rev. E. Jones	Gifts 1910–1913 (713–1917 and 311–1912 etc.)	Cave material with fossil Pleistocene bones, bear jaw etc.		Elbolton (Grassington)
*Sir John Brigg (1834–1911)	Formerly part of the KSLS coll, later kept at the home of A. Bottomley. (M. 320)	Coal Measure fossils (His 'collection of Yorkshire fossils' not yet found)		
*Alfred Bottomley	Formerly part of KSLS coll. and amalgamated in (part of 6782–6800)	Rock specimens	c. 1890's	
*J. Crowther	Loan coll. (possibly returned) (462–1913)	Coal Measure fossils		
*Mrs. Eckroyd	Donation of Mrs. Eckroyd (028–1904)	155 minerals, eggs, etc.		

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S. L. Mosley (1849–1929)	Donations 1904–1914 of 'duplicates' from his own collection at BPM (033–1904)	About 30 minerals	Pre. 1910	
H. Crowther	Formerly part of BPM collections and transferred to Keighley	20 Coal Measure fossils	Pre. 1913	Yorkshire
(G) Campbell	Gift c. 1906	40 stratigraphical rock samples 3S Minerals 380 Fossils (mostly Carboniferous, Silurian and Red Crag)	1860's, 1870's	Yorkshire and classic British localities
Charles Croft 1836–1914	Main collection acquired in 1907 More in 1910 (37–1910)	Over 4,000 fissils from most periods but largely Palaeozoic	1860's–c. 1900	Mostly Wales and Shropshire and classic localities. Also Bradford and Yorkshire.
J. Spencer	Acquired between 1904–1908	200 fossils mostly from the Silurian, Carboniferous, Jurassic and Cretaceous. A few microscope slides		
W. Gelders	No record	20 fossils, mostly Coal Measures	1880's, 1890's	Yorkshire
B. Southwell-Lees	Purchase 1904 (43/1904)	Minerals		N. England and Foreign (e.g. Bohemia)
*Burnley Literary and Philosophical Society	? Donation 1907, Miss Heaton	Fossils		Clitheroe
C. Bairstow	Donation 1907 (216/1907)	Minerals		No data
Moses Fieldhouse	Purchase c. 1910 (M. 313)	S2 Microscope slides most petrological		
Dr. Wheelton Hind (1860–1920)	Donation from the British Museum 1923/4 (1924–9S0)	129 Carboniferous fossils		
James Ellison	Purchased in 1928 from Ilkley Museum (114S–7/1928, 8480)	2,000 fossils mostly Carboniferous, Jurassic and Cretaceous and Red Crag. A few minerals	Pre. 1891	Craven, Wales, Yorkshire, Isle of Wight, N. Pennine minerals
E. E. Gregory	Donation (072/1904)	Local glacial erratics		Keighley area
R. Boxhall	Donation 1934 (193S–1523, 1934–14S4)	Minerals		Cornwall
John Holmes 1867–194S)	Main collection on loan in 1942 (3, 42, 4.42, 8.42, 12.41)	S00 Carboniferous marine band and other fossils	1920's–1930's	Craven and Keighley areas, Yorkshire
Thomas Hodgson	Donation c. 19S3	300 Petrological specimens		Northern England, Scotland, a few foreign
Rev. E. Jones	Gifts 1910–1913 (713–1917 and 311–1912 etc.)	Cave material with fossil Pleistocene bones, bear jaw etc.		Elbolton (Grassington)
*Sir John Brigg (1834–1911)	Formerly part of the KSLS coll, later kept at the home of A. Bottomley. (M. 320)	Coal Measure fossils (His 'collection of Yorkshire fossils' not yet found)		
*Alfred Bottomley	Formerly part of KSLS coll. and amalgamated in (part of 6782–6800)	Rock specimens	c. 1890's	
*J. Crowther	Loan coll. (possibly returned) (462–1913)	Coal Measure fossils		
*Mrs. Eckroyd	Donation of Mrs. Eckroyd (028–1904)	1SS minerals, eggs, etc.		

Table 2. Collections from Cartwright Memorial Hall, Bradford

Collector (biographical dates)	Source or method of acquisition (collection number)	Approximate number of specimens	Period of Collection	Collecting Area
Joseph Dawson (1740–1813)	Probably the collection purchased by the BPS in the 1860's as the Richardson collection	Over 2,000 minerals with a collection of rocks and marbles	Pre. 1810	World wide and Britain
Bradford Philosophical Society	Loaned to public library in 1879/80 and later given to Town Museum in 1880's (Z1–Z109)	Several hundred fossils from the Carboniferous, earlier Palaeozoic and also Jurassic	19th century	Northern England and classic British localities
John Maclandsborough	Bequest 1900 (L1–L129)	Mostly Coal Measure fossils	1840's	Mostly Yorkshire
W. Popplewell	1908 Donated by B. B. Popplewell (1725/08)	About 60 miscellaneous fossils including a collection of fossil fish from the Devonian		Devonian from Northern Scotland
William Cash (1843–1914)	Purchase 1913 (57.13)	Coal Measure fossils		Yorkshire
J. Monckman (1842–1906)	"Sent to Cartwright Hall"	100 miscellaneous fossils with catalogue list		General British
William Cudworth	Probably donated c. 1904 (250.32–264.32, 269.32–272.32, 287.32–331.32)	Cave material (and archaeological material) from Boyd Dawkins excavations. Fossil mammal bones	1890's	Cresswell Crags and Robin Hoods Cave, Victoria Cave (Settle) S. E. England and Norfolk
Percy Lund (Active 1885–1919)	Donation (5.1930)	300 Petrological specimens and other fossils		Northern England Craven and British
Clarence Becker	Donated by Mrs. Becker (NH.10.49)	103 Petrological specimens	1930's	World wide (USA, Egypt, etc.)
Dr. Mossop	Given by Mrs. West-Watson (G.8.57)	200 miscellaneous and unlabelled geological specimens and shells	c. 1890's	

Rev. D. Simon and J. H. Scarfe	? No record	30 minerals and ores	c. 1890's	South Australian mines
H. E. Wroot	Gift of Mrs. Wroot (NH 2.40–9.40)	Annotated books including "Geology of Yorkshire" and specimens		
W. P. Winter 1867–1950)	Donated by Mr. Gaskill (NH 42.52)	200 minerals, rocks, fossils		Gordale, Yorkshire and Britain
F. G. Woodgate	G.3.1969–G.11.1969	110 miscellaneous minerals and fossils		Mostly Yorkshire and Kent
Rev. E. Jones	'Permanent loan' (350.1932 to 368. 1932)	Cave material		Yorkshire — Elbolton and Calf Hole Caves and Derbyshire
R. Pennington	(335.32–343.32)	Cave material		Windy Knoll (Castleton) and Raygill fissure (Lothersdale)
*T. Tate	Donation (or loan) 1880's	Fossils and shells		
*Miss Cockbain	Donation (9.13)	Minerals		
*Isaac Teanby	Donation or loan (1886)	16 fossil teeth		
*F. Crowther	Donation	"Coll. of Minerals and fossils" "13 Fossil Mammoth Teeth"	c. 1880's	
*John Speak	Possible loan in 1890's. Perhaps later donated or possibly purchased by Clarence Becker	180 Petrology and fossil specimens		World wide
*Mrs. Ward	Donation 1912 (59.12)			
*J. A. Hargreaves	Donation (57/13)	About 80 Chalk fossils		
*Lomax Palaebotanical Co. Ltd.	1907 (28.1907, 29.1907)	Microscope slides		

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Collector (biographical dates)	Source or method of acquisition (collection number)	Approximate number of specimens	Period of Collection	Collecting Area
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Bradford Philosophical Society	Loaned to public library in 1879/80 and later given to Town Museum in 1880's (Z1–Z109)	Several hundred fossils from the Carboniferous, earlier Palaeozoic and also Jurassic	19th century	Northern England and classic British localities
John Maclandsborough	Bequest 1900 (L1–L129)	Mostly Coal Measure fossils	1840's	Mostly Yorkshire
W. Popplewell	1908 Donated by B. B. Popplewell (1725/08)	About 60 miscellaneous fossils including a collection of fossil fish from the Devonian		Devonian from Northern Scotland
William Cash (1843–1914)	Purchase 1913 (57.13)	Coal Measure fossils		Yorkshire
J. Monckman (1842–1906)	"Sent to Cartwright Hall"	100 miscellaneous fossils with catalogue list		General British
William Cudworth	Probably donated c. 1904 (250.32–264.32, 269.32–272.32, 287.32–331.32)	Cave material (and archaeological material) from Boyd Dawkins excavations. Fossil mammal bones	1890's	Cresswell Crags and Robin Hoods Cave, Victoria Cave (Settle) S. E. England and Norfolk
Percy Lund (Active 1885–1919)	Donation (5.1930)	300 Petrological specimens and other fossils		Northern England Craven and British
Clarence Becker	Donated by Mrs. Becker (NH.10.49)	103 Petrological specimens	1930's	World wide (USA, Egypt, etc.)
Dr. Mossop	Given by Mrs. West-Watson (G.8.57)	200 miscellaneous and unlabelled geological specimens and shells	c. 1890's	
Rev. D. Simon and J. H. Scarfe	? No record	30 minerals and ores	c. 1890's	South Australian mines
H. E. Wroot	Gift of Mrs. Wroot (NH 2.40–9.40)	Annotated books including "Geology of Yorkshire" and specimens		
W. P. Winter 1867–1950)	Donated by Mr. Gaskill (NH 42.52)	200 minerals, rocks, fossils		Gordale, Yorkshire and Britain
F. G. Woodgate	G.3.1969–G.11.1969	110 miscellaneous minerals and fossils		Mostly Yorkshire and Kent
Rev. E. Jones	'Permanent loan' (350.1932 to 368. 1932)	Cave material		Yorkshire — Elbolton and Calf Hole Caves and Derbyshire
R. Pennington	(335.32–343.32)	Cave material		Windy Knoll (Castleton) and Raygill fissure (Lothersdale)
*T. Tate	Donation (or loan) 1880's	Fossils and shells		
*Miss Cockbain	Donation (9.13)	Minerals		
*Isaac Teanby	Donation or loan (1886)	16 fossil teeth		
*F. Crowther	Donation	"Coll. of Minerals and fossils" "13 Fossil Mammoth Teeth"	c. 1880's	
*John Speak	Possible loan in 1890's. Perhaps later donated or possibly purchased by Clarence Becker	180 Petrology and fossil specimens		World wide
*Mrs. Ward	Donation 1912 (59.12)			
*J. A. Hargreaves	Donation (57/13)	About 80 Chalk fossils		
*Lomax Palaebotanical Co. Ltd.	1907 (28.1907, 29.1907)	Microscope slides		

The collections of the KSLS were acquired between about 1900 and 1914 and were described as 'moribund' and "the greater part of this collection was delapidated and nameless". An old catalogue of some of this collection exists and shows rocks and fossils (mainly from the Mesozoic) some minerals, and shells. One entry reads "specimens of fossils found in making the turnpike road between Keighley and Utley".

A collection of fossil sponges made by E. T. Connold also came in as part of the KSLS collection. He was the Honorary General Secretary of Hastings and St. Leonards-on-Sea Natural History Society at the turn of the century, at the same time that Ruskin Butterfield (brother of Rosse Butterfield who was curator at Keighley from 1910–38) was curator at the museum in Hastings.

E. E. Gregory — the geological recorder for Keighley Naturalists and the Bradford Scientific Association — was particularly interested in the glacial history of the area and contributed to scientific journals, e.g. *The Naturalist*. His collection of erratic boulders was deposited in the museum.

In 1928, the large fossil collection made by James Ellison of Steeton (near Keighley) during the 19th century, was purchased from Ilkley Corporation Museum. The specimens all have data and many are from the Craven area.

In 1941 an important local fossil collection from the Millstone Grit, made by John Holmes of Cross Hills (near Keighley), was acquired, originally as a loan. Holmes was a member of local naturalist societies and a frequent donator to Keighley Musuem. He worked with W. S. Bisat on the zonation of the Millstone Grit using goniatite fauna and several species were first collected in this area. Although type specimens went to London, this remaining collection contains a variety of fossils with data, mostly from marine bands in the Keighley district. Holmes also contributed articles to *The Naturalist*.

Thomas Hodgson was a naturalist colleague of Holmes and hundreds of petrological specimens with his data came to the museum in the 1950's.

The geological collections originating at Cartwright Memorial Hall are essentially based on those of the Bradford Philosophical Society (BPS). They were originally on loan to the old public museum in the later nineteenth century, but finally came permanently to the museums after the opening of the public museum at Cartwright Hall in 1904. Most of the mineral, rock and fossil collections have data, but some have suffered from re-labelling processes, and misinterpretation of original labels. Most of the BPS collection has also suffered from having various temporary homes in the last century. Even in 1864 when demand for a public museum began to grow, the collections were "in a state both disgraceful and deplorable". The same year, Louis Compton Miall was appointed curator of the BPS collections, and £300 was spent on purchasing the collection of "W. Richardson of Southowram". No trace of this collection can be found, but there is a large mineral collection made before 1810 by Joseph Dawson of Royds Hall (Bradford), complete with catalogue and original labels. Dawson was a minister who owned coal and stone mines, and was a founder of the Low Moor Iron Company in Bradford in the 1790's. He was a keen scientist and a friend of Sir Joseph Priestley. The Richardsons were also a scientific family (Richard Richardson, an ancestor, was a friend of, and corresponded with, Sir Hans Sloane, and exchanged geological specimens with him) and Dawson lived in one of the Richardson family houses. With deaths occurring in both families in the 1860's it seems not unlikely that a geological collection, which may have changed hands earlier, may have come up for sale. This "valuable mineralogical collection", often referred to in the Society's reports, contains many interesting specimens. Some bear old purchase prices. Labels have become detached from many specimens, and cannot be re-united with any certainty.

The BPS fossil collection, although general, has an emphasis on the Carboniferous. Included in the collection is a holotype labyrinthodont *Pholiderpeton scutigerum* Huxley, which was found in a Bradford coal pit in 1868 and was described and figured by Huxley in Q. J. G. S. Vol. XXV 1869. This year the specimen has gone on loan to Newcastle University for research by Dr. A. Panchen and Ms. J. Agnew.

About 1900 a bequest of Coal Measure fossils was left by John Maclandsborough F.G.S., who was a civil engineer and an active member of the Y.N.U. and BPS. His correspondence

shows that he purchased much of his collection from other amateur geologists. Dr. James Monckman, a founder member of the Bradford Scientific Association and contributor to local scientific journals, particularly with articles on the glaciation of Airedale, also gave his miscellaneous collection. Other local amateurs were J. A. Hargreaves, a Baildon schoolmaster and frequent lecturer to local societies; and William Cudworth, noted for his historical notes on the Bradford district in the nineteenth century, who purchased some of Professor Boyd Dawkins excavation material from Victoria Cave, Settle, and Derbyshire. John Speak, who seems to have had a private museum display at Queensbury (and perhaps is the same Speak whose ethnographic collections went to Huddersfield) loaned some items to the Bradford public museum in the 1880's. Although part of this collection was accessioned as a 'bequest' in the 1930's, it does not include the geology section which appears in a catalogue of the Speak collection. Some of the undated specimens in the Clarence Becker collection came from the same localities as the Speak geological specimens, and Becker may, therefore, have purchased part of this collection.

Part of the large collection made by William Cash, F.G.S., was purchased in 1913. He was a Halifax man and collected much in the Bradford area. He studied and wrote on Carboniferous cephalopods and later Coal Measure plants. He was an honorary member of the Bradford Naturalists Society and a member of the Y.N.U. Fossil Flora Committee.

Percy Lund was a printer from Ilkley and collected Craven fossils. His comprehensive collection contains rocks from all over northern Britain. He also wrote articles in scientific journals, including *The Naturalist*.

Amongst documentary material in the museum collection is an annotated edition of P. F. Kendall and H. E. Wroot's classic *The Geology of Yorkshire*. The book, given by Mrs. H. E. Wroot in 1945, contains a number of original letters and notes by eminent geologists with whom the authors corresponded. H. E. Wroot was also a member of the Bradford Scientific Association.

There is also correspondence between John Brigg of Keighley and W. H. Dalton and J. R. Dakyns of the Geological Survey.

Enquiries about any parts of the collections are welcomed and collections may be seen by appointment.

THE CRANEFLIES (DIPTERA: TIPULIDAE) IN BRADFORD MUSEUM COLLECTIONS

E. G. HANCOCK

Bolton Museums and Art Gallery, Le Mans Crescent, Bolton BL1 1SA

At the request of Miss M. M. Hartley, Keeper of Natural History at Cliffe Castle Museum, Keighley, where Bradford Metropolitan District's Natural History collections are stored, I examined and redetermined the craneflies from their reference material. The collections of insects are based on specimens from the former Keighley Museum mainly collected by J. Wood and from the Cartwright Hall Museum mainly collected by F. Rhodes, 1862–1931 (obituary: Butterfield, 1932) and other members of the Bradford Naturalists and Microscopical Society. Many specimens were collected in the immediate vicinity of the two towns. J. Wood was a collector and local recorder of many forms of insect life and contributed specimens to other collections, in particular sending specimens to W. D. Hincks at Manchester. However, the Diptera are complemented by some specimens from C. A. Cheetham, 1875–1954 (obituary: Smith, 1954), a well-known dipterist whose main collections are in Leeds City Museum. Numerous specimens of his are also in the national collections in the British Museum (Natural History). Cheetham published several notes on craneflies, especially in *The Naturalist* (e.g. 1924), and some of his specimens were described as new to science by Edwards (1924).

Nearly all the material dates from the 1920's and although the number of specimens is small, the coverage is fair at 98 species out of the 314 currently identified as occurring in Britain. (The number known at the time was somewhat smaller.) Naturally enough the number of species represented falls off markedly among the eriopterine subfamily containing the smallest craneflies and among this section were numerous Chironomids, Mycetophilids and some Culicids. The three small families normally included with "craneflies", the Trichoceridae, Anisopodidae and the Ptychopteridae, have been included in the following list. The localities and dates are given as on the data labels and Cheetham's specimens are identified by "C.A.C." following the date. There are a few specimens which have no data and although they have been determined, they are not included in the lists except where they fill gaps in coverage. The data given in some cases refer to more than one specimen in the collection.

Trichoceridae (Winter gnats)

Trichocera annulata Meigen Sunnydale, Morton, 25 Sept. 1926; Holmehouse Wood, Keighley, 4 Nov. 1929

T. heimalis (Degeer) Holmehouse Wood, 24 Nov. 1929; 9 Dec. 1925

T. maculipennis Mg. Park Wood, 13 May 1925. This is an interesting record. This species occurs sporadically in early summer in woods, caves and mineworkings.

T major Edwards Redcliffe Street, 1 Jan. 1933

T. saltator (Harris) Holmehouse Wood, 24 Nov. 1932; 31 Nov. 1925; Riverside 25 Feb. 1926

T. regelationis (Linn.) Marley, 10 Sept. 1923; Riverside, 20 Dec. 1925; Keighley 23 April 1925; Craven Walk 15 April 1920; Holmehouse Wood, 25 Jan. 1921; 9 Oct. 1929; Bradford Road, 26 March 1926

Tipulidae: Tipulinae

Prionocera turcica (Fabr.) Gn (probably Grassington), June 1920; Holme (East Yorks) 17 May 1924, C.A.C.

Ctenophora atrata (Linn.)
v. *ruficornis* Mg. no data

C. nigricornis Mg. no data

C. bimaculata (Linn.) Wharfe (Barden), no date, 3 pupae

Nephrotoma lunulicornis (Schummel) Cragwood, Rawdon, June 1919

N. appendiculata (Pierre) no data

N. crocata (Linn.) no data

N. flavescens (Linn.) Keighley, 1915; Hardings Lane, 22 July 1930; Bishop Auckland (Durham), 14 July 1900

N. flavipalpis (Mg.) Dowley Gap, Aug 1918

N. questfalica (Westhoff) Saltaire, June 1915; Cragwood, June 1919

N. quadrifaria (Mg.) Malham, 4 June 1910

Tipula (Tipula) oleracea (Linn.) Marley, 4 Oct. 1926; 5 Oct. 1925; Saltaire, June 1918; Holmehouse Wood, 23 June 1932; Cragwood, June 1919

T. (T.) paludosa Mg. Holmehouse Wood, 28 July 1925; Gn., June 1920; Cottering, Aug. 1932

T. (Acutipula) Iuna West. Holmehouse Wood, 12 June 1932; Shiplen Glen, June 1918

T. (A.) fulvipennis Degeer Adel, 4 July 1924, C.A.C.

T. (A.) maxima Poda Thorne, 14 June 1924 C.A.C.; Bradford, June 1919; Parkwood, 1 Aug. 1929

T. (A.) vittata Mg. "A" (? = Austwick) 16 May 1925; C.A.C.

T. (Schumellia) variicornis Schum. Gn (? = Grassington), June 1920; Cragwood, Rawdon, June 1919

T. (Savtshenkia) alpium Bergroth Adel, 2 June 1924, C.A.C.

T. (S.) cheethami Edwards 1924 Whernside, 1 June 1925, C.A.C. This species was described as new by Edwards from Arran (holotype) and a male from Yorkshire (paratype). The data on this latter specimen is Whernside, 22 June 1924, and therefore this specimen is a topo type. It has been marked accordingly.

T. (S.) subnodicornis Zetterstedt Meltham, 15 May 1920, C.A.C.

T. (S.) staegeri Nielsen Holmehouse Wood, 11 Oct. 1925
T. (S.) signata Staeger A (? = Austwick) 8 Oct. 1922, C.A.C.
T. (S.) marmorata Mg. Parkwood, 4 Sept. 1925; Farnley (nr. Leeds) 21 Aug. 1920; Malham, Aug. 1918
T. (S.) rufina Mg. Holmehouse Wood, 25 May 1932
T. (S.) pagana Mg. Keighley, 1915; Bingley, June 1918; Holmehouse Wood, 25 Oct. 1925
T. (Oreomyza) truncorum Mg. Adel, 26 June 1924, C.A.C.
T. (Pterelachisus) irrorata Macquart Coxley, 25 June 1925, C.A.C.
T. (P.) meigeni Mannheims Cray, 24 May 1920, C.A.C.; Adel, 27 June 1924, C.A.C.
T. (P.) varipennis Mg. Holmehouse Wood, 16 June 1932; Saltaire, June 1918
T. (Beringotipula) unca Weidmann Holmehouse Wood, 9 June 1932; Adel, 4 July 1924, C.A.C.
T. (Dendrotipula) flavolineata Mg. Pately, 24 June 1924, C.A.C.
T. (Vestiplex) montana Curtis Bowfell, July 1924 (C.A.C., collected by W. H. Pearsell)
T. (V.) scripta Mg. Chellow Dean, 19 July 1920 (C.A.C., collected J.W.C. — ? J. W. Carter); Bradford Road, 10 May 1926; Shipley Glen, June 1920; Ingleborough, 7 July 1923, C.A.C.
T. (Platytipula) luteipennis Mg. A (? = Austwick) 1 Oct. 1921, C.A.C.
T. (P.) melanoceros Sch. A (? = Austwick), 13 Sept. 1925, C.A.C.
T. (Yamatotipula) montium Egger Coverdale, 17 June 1922, C.A.C.
T. (Y.) pruinosa Wied. Witherslack, 12 July 1926, C.A.C.
T. (Y.) couckei Tonnoir Ryhill, 16 May 1919, C.A.C.
T. (Y.) lateralis Mg. Sunnydale, July 1916
T. (Lunatipula) lunata Linn. Cragwood, June 1919; Saltaire, June 1918; Bingley, June 1918
T. (L.) peliostigma Sch. no data
T. (L.) cava Riedel A (? = Austwick), 15 July 1922, C.A.C.
T. (L.) vernalis Mg. Shipley Glen, June 1919; Saltaire, June 1918; Cragwood, June 1919
Cylindrotominae There are no representatives of this subfamily
Limoniinae, Limoniini
Limonia (Metalimonia) bifasciata (Shrank) no data
L. (M.) quadrinotata (Mg.) no data
L. (Limonia) flavipes (Fabr.) Holmehouse Wood, 13 June 1932
L. (L.) nubeculosa Mg. Bishop Auckland; Dowley Gap, 5 June 1925; Holmehouse Wood, 10 Oct. 1923
L. (L.) tripunctata (Fabr.) Holmehouse Wood, 9 June 1932; Saltaire, June 1919
L. (Dicranomyia) modesta (Mg.) no data
L. (D.) ornata (Mg.) Holmehouse Wood, 7 June 1932
L. (D.) chorea Mg. Sunnydale, Morton, 25 June 1925; Redcliffe St., 9 June 1932, Marley, 16 June 1925; Craven Walk, 25 May 1926; Holmehouse, 7 June 1926
L. (Rhipidia) duplicata Doane Park Wood, 7 Sept. 1923; Holmehouse Wood, 9 Sept. 1925; 12 June 1932; Farnley, 21 Aug. 1928
Helius longirostris (Mg.) Shipley Glen, June 1920
Pediciini
Pedicia (Pedicia) rivosa (Linn.) Shipley Glen, June 1919; Bingley, Aug. 1919; Holmehouse, 8 June 1932; Myers Rough, May 1919; Sunnydale, June 1919
P. (Crunobia) littoralis (Mg.) Holmehouse Wood, 8 Sept. 1929; Saltaire, May 1919
P. (Tricyphona) immaculata (Mg.) Marley, 5 Oct. 1925; Holmehouse, 9 June 1932
Hexatomini
Epiphragma ocellaris (Linn.) no data
Austrolimnophila ochracea (Mg.) Holmehouse Wood, 23 June 1932
Limnophila (Eloeophila) maculata (Mg.) Shipley Glen, June 1920; Holmehouse Wood, 9 June 1932
L. (Phylidorea) fulvonervosa (Sch.) Holmehouse Wood, 23 June 1932; Shipley Glen, June 1920
L. (P.) lineola (Mg.) Holmehouse Wood, 20 Sept. 1925

L. (P.) meigeni Verrall Sunnydale, 25 May 1925
L. (Limnophila) punctata (Scrhank) Holmehouse Wood, 25 May 1925
L. (Brachylimnophila) nemoralis (Mg.) Greystones, 26 Aug. 1925; Marley, 8 Oct. 1925; Holmehouse Wood, 25 July 1925
L. (Pilaria) discicollis (Mg.) Marley, 8 Aug. 1925
Hexatoma bicolor (Mg.) Greystones, 8 June 1925
Eriopterini
Neolimnophila carteri (Tonn.) Mann Park, 30 July 1920
Gonempeda flava (Sch.) Holmehouse Wood, 13 June 1932
Cheilotrichia (Cheilotrichia) imbuta (Mg.) Marley, 8 Aug. 1925
C. (Platytoma) cinerascens (Mg.) Park Wood, 4 Sept. 1925; Ilkley, 29 Aug. 1925; Holmehouse Wood, 13 June 1923; Shipley Glen, July 1928; Gargrave, Aug. 1925; Marley, 30 Sept. 1925; Howden Rough, 13 Sept. 1925; Greystones, 29 Aug. 1923
Erioptera (Symplecta) hybrida (Mg.) no data
E. (S.) stictica (Mg.) Marley, 3 Sept. 1923; Bradford, (Canalride), 29 July 1920
E. (Erioptera) diuturna (Walker) Bingley, June 1925; Marley, Aug. 1925
E. (E.) fuscipennis Mg. no data
E. (E.) lutea var. *taenionata* Mg. Marley, 1 Aug. 1925; Holmehouse Wood, 8 Sept. 1920
Erioconopa trivialis (Mg.) Bingley, 17 Aug. 1920
E. (Ilisia) maculata Mg. Bingley, 17 Aug. 1920; Holmehouse Wood, 28 July 1925
E. (I.) occoecata (Edwards) Riverside, (Near Bradford), 7 July 1925
Ormosia (Ormosia) aciculata Edwards Holmehouse Wood, 23 June 1932
O. (O.) bicornis de Meijere no data
O. (O.) hederae (Curtis) Sunnydale, 23 May 1923; Bradford Road, 19 Sept. 1923; Marley, 19 May 1929
O. (O.) albitibia Edwards Holmehouse Wood, 14 Aug. 1926; Marley, 9 Oct. 1925
O. (O.) nodulosa (Macquart) Deepdale 26 Nov. 1901; Gargrave, June, 1925
O. (O.) staegeriana Alexander no data
O. (Rhypholophus) bifurcata (Goetghebuer) Sunnydale, 12 Sept. 1928
O. (R.) haemorrhoidalis (Zett.) Holmehouse Wood, 20 Sept. 1925; Ilkley, 29 Aug. 1925
O. (R.) varia (Mg.) Park Wood, 4 Sept. 1925; Holmehouse Wood, 13 July 1923
Tasiocera fuscescens (Lackshewitz) Greystones, 7 June 1925; Holmehouse Wood, 23 May 1926
Molophilus bifidus Goet. Steeton, 4 July 1925
M. cinereifrons de M. Holmehouse Wood, 23 Aug. 1925; Shipley Glen, 27 July 1925
M. flavus Goet. Marley, 1929
M. griseus (Mg.) Marley, 25 Aug. 1928
M. obscurus (Mg.) Marley, 15 Aug. 1925
M. medius de M. no data
M. pleuralis de M. Holmehouse Wood, 4 Oct. 1928
Ptychopteridae
Ptychoptera albimana (Fabr.) Marley, 23 Sept. 1928; Greystones, Aug. 1925; Holmehouse Wood, 12 May 1924; Howden Rough, 2 Oct. 1926.
P. minuta Tonn. Bingley, June 1918
P. contaminata (Linn.) Winterburn, 1 Aug. 1932; Riverside (Bradford) 5 July 1925.
P. lacustris Mg. Marley, 25 July 1925; Holmehouse Wood, 16 July 1932; Shipley Glen, June 1920; Bingley, June 1918.
Anisopodidae
Sylvicola punctata (Fabr.) Redcliffe St., 10 June 1932; Holmehouse Wood, 9 Oct. 1926; Howden Rough, 16 Oct. 1926; Shipley Glen, June 1919
S. cinctus (Fabr.) Shann Lane, 4 April 1931; Holmehouse Wood, 19 Oct. 1926.

DISCUSSION

The collection of 98 species gives a reasonable reflection of the cranefly population of the Bradford area of about fifty years ago. There are noticeable gaps which are unlikely to be genuine absences such as the members of the Cylindrotominae subfamily and the genus *Gonomyia*; these could probably be filled fairly easily with a little field work. The best coverage is in the tipuline subfamily mainly due to the inclusion of male and female examples of many of these species from Cheetham's collections. Unfortunately, some of his labels are in a letter code which cannot be deciphered at present. The only exception to this is "A" which is probably Austwick, as given in Cheetham (1923). The majority of the specimens bear small circular blue labels with another letter code for which there is a key and are from the John Wood collection. For this reason nearly all the localities mentioned above are from the National Grid square SE(44)04.

The following is a list of the grid references for the localities recorded, where they are known: Holmehouse Wood, SE0340, Park Wood SE0640, Redliffe St. SE0541, Marley SE0940, Craven Walk SE0640, Bradford Road, Steeton, Keighley SE04, Sunnydale, SE1043, Ilkley SE14, Howden Rough SE0745, Farnley SE2532, Rawdon, Crag Wood, SE23, Shipley Glen SE1239, Myers Rough SE1235, Dowley Gap, Saltaire, Bradford, Bingley, Chellow Dean SE13, Grassington SE06, Wharfe(Barden) SE05, Adel SE2741, Thorne SE6813, Meltham SE0910, Coxley SE2717, Pately SE1666, Coverdale SE0581, Ryhill SE3814, Greystones SE0439, Malham SD96, Whernside SD7482, Cray SD9379, Ingleborough SD77, Witherslack SD48, Gargrave SD95, Bow Fell NY2406, Bishop Auckland NZ2130, Shann Lane SE0442.

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THE CADDISFLIES (TRICHOPTERA) IN BRADFORD MUSEUM COLLECTIONS

J. R. A. GRAY

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At the request of Miss M. M. Hartley, Keeper of Natural History at Cliffe Castle Museum, Keighley, I examined the Trichoptera Collection belonging to the City of Bradford Metropolitan Council. Each specimen was re-determined and in many cases the genitalia were removed and cleared to assist in identification. All specimens were determined specifically with the exception of those where the abdomen was lacking. The specimens were named according to Kimmins (1966) with the exception of the male Hydropsychidae which were determined using Hildrew and Morgan (1974) and classified using their revised nomenclature.

Seventy-one specimens were present belonging to thirty species with the possible presence of three further species which could not be identified specifically. Although the number of

specimens in the collection is small they cover eleven of the fifteen families present in Britain.

It would appear that the collection has been derived rom three sources on the basis of label style and handwriting. Material from the Keighley Museum was collected mainly by J. Wood and that from Bradford by F. Rhodes and members of Bradford Naturalists and Microscopical Society. The identity of the third collector remains unknown.

RHYACOPHILIDAE

Rhyacophilinae

Rhyacophila dorsalis (Curtis). Arncliffe, July 1909; Malham, 30.5.1909; Grass Wood, 5.5.1928; Marley, 23.10.1928.

Glossosomatinae

Glossosoma conformis Neboiss. Arncliffe, July 1909; Hawksworth, Aug. 1909; Holmehouse Wood, 19.6.1928.

Agapetus fuscipes Curtis. Saltaire, July 1909; Kildwick, 1.6.1919.

HYDROPTILIDAE — no specimens.

PHILOPOTAMIDAE

Philopotamus montanus (Donovan). Holmehouse Wood, 12.4.1925.

POLYCENTROPIDAE

Plectrocnemia conspersa (Curtis). Thornton, July 1909; Holmehouse Wood, 10.6.1924, 4.8.1931.

PSYCOMYIIDAE — no specimens.

HYDROPSYCHIDAE

Hydropsyche siltalii Döhler. Hawksworth, Aug. 1909.

Hydropsyche sp. ♀ Holmehouse Wood, 1.8.1909.

Diplectrona felix McLachlan. Holmehouse Wood, 19.6.1926.

ODONTICERIDAE

Odonticerum albicorne (Scopoli). Hawksworth, August 1909.

PHRYGANEIDAE

Phryganea grandis L. Keighley, June 1908.

Phryganea obsoleta McLachlan. Sunnydale, Morton, 31.7.1931.

Phyrganea striata L. Stoney Ridge, July 1909; no data.

LIMNEPHILIDAE

Drusinae

Ecclisopteryx guttulata (Pictét). Arncliffe, July 1909.

Limnephilus affinis Curtis. no data.

Limnephilus centralis Curtis. Arncliffe, July 1909; Sunnydale, East Morton, August 1916; Holmehouse Wood, 1.9.1924.

Limnephilus lunatus Curtis. Sunnydale, 20.8.1916; Marley, 9.10.1925.

Limnephilus marmoratus Curtis. Tip, Riverside, 27.8.1925.

Limnephilus rhombicus (Linnaeus). Tip, Riverside, 20.8.1925.

Limnephilus sparsus Curtis. Sunnydale, East Morton, August 1906. (Fabricius).

Limnephilus vittatus (Fabricius). Stoney Ridge, August 1909.

Limnephilus sp. Grassington, Sept. 1909.

Anabolia nervosa (Curtis). Sunnydale, East Morton, August 1906; Arncliffe, July 1909; Sunnydale Morton 2.8.1924; Stockbridge, Keighley, 9.10.1931.

Potamophylax latipennis (Curtis). Malham, 30.5.1909, 4.6.1911; no data.

Potamophylax sp. Malham, June 1901, 1.6.1909.

Halesus digitatus (Schranck), Holmehouse Wood, 1.11.1925.
Stenophylax permistus McLachalan. Eldwick, September 1909.
Stenophylax vibex (Curtis). Hudd, 1909.
Allogamus auricollis (Pictét). Grassington, September 1909.
Chaetopteryx villosa (Fabricus). Holmehouse Wood, 31.10.1926.

LEPTOCERIDAE
Athripsodes albifrons (Linné). Grassington, September 1909.
Athripsodes aterrimus (Curtis). Ryhill, July 1909.

MOLANNIDAE — no specimens.

BERAEIDAE — no specimens.

SERICOSTOMATIDAE
Sericostoma personatum (Spence). Malham, 4.6.1911.

GOERIDAE
Silo pallipes (Fabricius). Holmehouse Wood 19.6.1926.

BRACHYCENTRIDAE — no specimens.

LEPIDOSTOMATIDAE — no specimens.

All the above records refer to adult Trichoptera, and in some cases represent more than one specimen. Most of the specimens have been collected in the Bradford and Keighley areas, and a list of localities with, where possible, National Grid References is as follows: Holmehouse Wood SE0340; Sunnydale, East Morton SE1043; Stoney Ridge, Hawksworth SE1641; Keighley SE04; Malham SD96; Saltaire SE1437; Kildwick SE0141; Arncliffe SD9371; Grassington SE0064; Ryhill SE3814; Stockbridge, Keighley SE0742; Marley SE0940; Tip, Riverside, Keighley SE04; Eldwick SE1240; Hudd; Thornton, Bradford SE1032; Grass Wood, SD9865.

Discussion

None of the species present is of restricted occurrence, being largely represented by the the strong flying and conspicuous members of the Limnephilidae and Phyrganeidae. Nevertheless the records are worthy of publication if only to stimulate further collecting in this group of insects. The problems of identification of adult Trichoptera have been largely overcome with the publication of a new handbook (Macan, 1973). Many species are attracted to light and are regularly taken by lepidopterists who may be stimulated to add to our knowledge of the distribution of this group. A recording scheme for Trichoptera has been established by the Biological Records Centre and cards are available. These records are of further interest in that, as some of the localities may have become more heavily polluted since the specimens were collected, these species may not be present today.

Acknowledgements

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FIELD NOTES

Scarce Silver-Lines in South Yorkshire

During the last week in May, 1978 I was fortunate to obtain no less than five larvae of the Scarce Silver-Lines moth (*Bena prasinana* Linn.) by beating oaks at Potteric Carr Nature Reserve, near Doncaster, South Yorkshire.

Unhappily, I only managed to rear one moth successfully, this emerging on 7th July, 1978. Subsequently, on 28th July, 1978 a single Scarce Silver-Lines entered a mercury vapour trap at my home at Old Rossington, near Doncaster, approximately three miles from Potteric Carr. It would appear, therefore, that the species is established in the Doncaster area. I am informed by the Y.N.U. Recorder that these constitute the first Yorkshire records. There are, however, records for the neighbouring counties of Lincolnshire, Nottinghamshire and Derbyshire, so the appearance of this moth in South Yorkshire is perhaps not entirely unexpected.

R. I. Heppenstall

Squirrel Fleas on Stoats

A male of the flea *Monopsyllus sciurorum* (Schr.), a species normally associated with red squirrels (*Sciurus vulgaris* L.), was found on a male stoat (*Mustela erminea* L.) in ermine pelage, shot in Inverness-shire early in 1972.

As the pine marten (*Martes martes* L.), a major predator of red squirrels in Scotland, frequently harbours *M. sciurorum*[4], and as stoats have been known to take young red squirrels[5], it is reasonable to assume that the stoat 'picked up' the flea whilst either preying on a red squirrel or more likely whilst searching dreys for young — dreys usually contain large numbers of fleas.

It has been shown[1 and 2] that stoats regularly hunt arboreally and Day[1] found that squirrels (undetermined) formed 1.5% of 168 prey items taken by stoats. A grey squirrel *(Sciurus carolinensis* Gmelin) was recorded as prey in Yorkshire[2], indeed King[3] reports that stoats are sometimes poked from grey squirrel dreys during winter time drey destruction operations and that on 10th August, 1969, a stoat from Wytham Wood, near Oxford, was found carrying two females of the North American grey squirrel flea *Orchopeas howardii* (Baker).

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C. A. Howes
Museum & Art Gallery, Doncaster

CORRECTION

Due to a regrettable error by one of the authors (PAS) of the paper on The Provenance of Gizzard Grit from the Red Grouse (*Lagopus lagopus scoticus* (Lath.)) of Bleaklow, Derbyshire (*Naturalist* **103**: 145–150) the grids to tables 3 and 4 were transposed.

THE NOCTULE BAT, *NYCTALUS NOCTULA* (SCHR.) IN YORKSHIRE

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INTRODUCTION

Although Jos. Armitage[1] and Arthur Whitaker[21, 22, 23 and 24] carried out significant pioneer studies on the roosting behaviour and breeding biology of the noctule *Nyctalus noctula* (Schr.) in the Stainborough and Rockley area, Maurice Johnson (unpublished) undertook bat banding work in the Halifax area, and the author[11 and 12] investigated the diet of a colony of noctules near Doncaster, information on this relatively familiar bat is still extremely sparse. It is useful therefore, to record recent observations and to review Yorkshire data in the light of current knowledge.

FIELD NOTE

On 13th March, 1978, several large beech trees *Fagus sylvaticus*, a feature of 18th century landscaping, were felled at Cusworth Park, Doncaster (Grid ref. SE 5403). One tree, which housed generations of jackdaw *Corvus monedula* and starling *Sturnus vulgaris* nests in a series of rot holes, also contained ten large bats assumed to be noctules. Some of these escaped but most were taken by local children and suffered unknown fates. One female bat, a noctule, which died from its injuries, was weighed, measured and examined for parasites.

On 15th March, 1978, a mature oak *Quercus robur* was felled in the wooded Doncaster suburb of Bessacarr (Grid ref. 43/6299) and was found to contain nine large bats, six of which were taken into care by Inspector Edwards of the R.S.P.C.A. On 6th April, the bats, one male and five female noctules, were weighed and examined for parasites, but due to the risk of rousing them from their torpid state only their fore-arm measurements were taken. Interestingly the bats, which had been housed in an unheated brick garage, had been left to select their own roost site and had chosen to hide at floor level beneath black polythene sheeting in an aluminium chest — the coldest though most draught-free site in the building. One female which had not occupied the chosen roost was released but was later found dead.

At about 21.30 hrs. on 16th and 17th April, the remaining specimens were noticeably restless. At 22.00 hr. on 18th April they were reweighed and released into a hollow beech tree in Sandall Beat Nature Reserve (Grid ref. 44/6103). It is noteworthy that on reviving from their torpid state when being handled and placed into a travelling cage, the male attempted copulation with one of the females. This was again noticed with the same female shortly before release. Soon after being introduced into the tree, three specimens flew off and through the leafless canopies several times before making off along woodland clearings.

DISTRIBUTION AND STATUS

The noctule has an extensive distribution, occurring throughout the palaearctic north to 60° latitude in Scandinavia[18]. In the British Isles it appears to exhibit a relatively south eastern preference, being absent from Ireland and only sparsely recorded from north western England. The great majority of British records are from the southern and eastern counties of England, occurrences thinning out to the north of Yorkshire. Its presence in Durham was confirmed by a specimen taken in 1836 (though not identified until 1855) between Harton and Cleadon[14] and twenty five noctules (rat bats) were found in a large oak being dealt with at a timber yard in Barnard Castle on 26th February, 1886[15]. There are only two confirmed Scottish records, these being from Deune, Perthshire (13/10/1904) and Duffus, near Elgin, Morayshire (1/10/1909)[2].

In Yorkshire, where up till 1884 Northallerton represented the noctule's most northerly British locality, Clarke and Roebuck[5] regarded it as being "widely distributed and not

uncommon . . . being found up to an altitude of 700 ft. at Carperby, Wensleydale." Grabham[8] considered Yorkshire to be its northern stronghold.

In the south of the county from the lowland Doncaster area across the coal measures to Barnsley and from the upland districts around Sheffield, records reviewed by the author[10] indicate it to be well established in suitably timbered areas. Taylor[19] found it to be "not uncommon in the plain of York" though in the Bradford area a review of natural history recording 1875–1925 showed it to be "only rarely identified"[4]. Even with the scant information available to them Clarke and Roebuck[5] detected a lessening in frequency in the north and west of the county, a pattern borne out by subsequent recording, see fig. 1.

Due to many of the old records referring to general areas rather than to specific sites, it has not been possible to work out detailed map references, therefore the distribution map (fig. 1), based on information stored in the Y.N.U. card index, is organized on a 5 km. square basis. With Barrett-Hamilton[2] maintaining that noctules are easy to identify on the wing, sight records of any large bat seem, in the past, to have been accepted as being of noctules. However, as other species could easily be involved, these records are no longer acceptable and, together with other records where there is no evidence of the specimens having been examined, have been indicated on the map by open circles. Localities for handled, verified specimens are indicated by solid dots.

Measurements

Very little data is available either for measurements or weights, though a series of twenty two specimens is available for study in the following Yorkshire museums: Doncaster (two), Keighley (eleven), Leeds (two), York (five) and Sheffield (two). Forearm measurements from a sample of these fall within the range of 47–55 mm. quoted by Stebbings[18], though as few of the preserved specimens were measured when fresh, shrinkage (some of the specimens being very old) may have rendered some measurements invalid for clinal studies. Forearm data from specimens measured when fresh is presented in tables 1 and 4 and a series of additional measurements of the two Doncaster Museum specimens is presented in table 2.

Table 1 Forearm measurements of Yorkshire noctules

Sex	Forearm length	Date	Locality and grid reference	Source
?	54.0 mm.	12/3/1968	Bolton Abbey (44/0754)	Keighley Museum
♀	53.9	13/3/1978	Cusworth Park (44/5403)	Doncaster Museum
♀	51.7	6/4/1978	Bessacarr (43/6299)	Doncaster Museum
♀	51.0	24/4/1975	Holm House Wood (44/1039)	Keighley Museum
?	51.0	1973	Fryston Wood (44/4625)	Y.N.U. Ann. Rep. for 1973 p. 2–8
♂	50.0	29/6/1905	Rockley (44/3302)	Sheffield Museum
♀	49.2	5/8/1919	Helmsley (44/6183)	Yorkshire Museum
♀	49.0	—/5/1898	Grimston Park (44/4941)	Yorkshire Museum
♀	48.0	24/4/1975	Holm House Wood (44/1039)	Keighley Museum

Table 2 Measurements of two adult female noctules in Doncaster Museum

Locality	Head and body	Tail	Wingspan	5th digit	Ear length	Ear width	Tragus width
Cusworth	80.0	15.0	322.0	53.0	17.0	14.0	5.0
Bessacarr	80.0	14.2	322.0	53.0	16.5	13.5	5.5

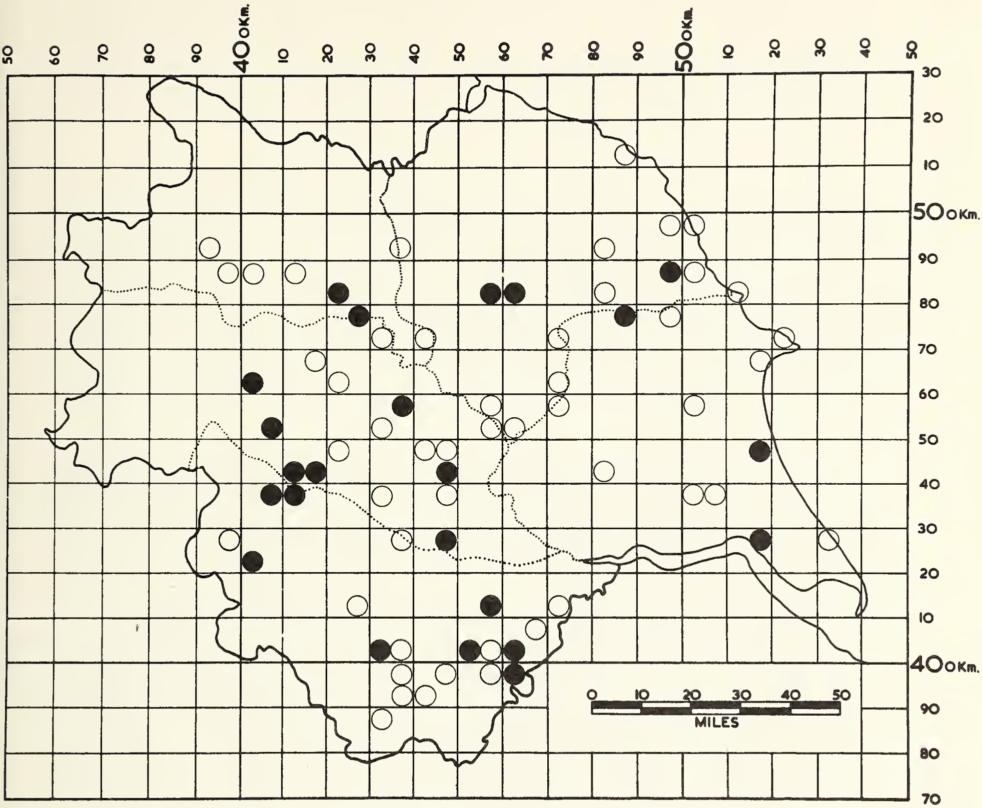

Figure 1. Distribution of the noctule in Yorkshire.
○ Records not critically identified.
● Specimens critically examined.

Little information is published on the weights of noctules in the wild. Stebbings[18] quotes a range of 14–40 gm and Cranbrook and Barrett[7], recording the weights of eight individual males caught while feeding, give the weight ranges as 28–34 gm for the June–July period and 33–38 gm during early October. Kleiman and Racey's[13] captive animals were at their lowest weights at the end of March, the average for parous females being 25.4 gm (range 22.3–30.3 gm; n = 18) and 25.2 gm for adults males (range 20.1–28.8 gm; n = 17). Greatest weight increases were recorded during August, females gaining nearly twice as much as males. Despite the availability of a constant supply of food, weight gains progressed at a much reduced rate in September. Peak weights were achieved during mid October when the average weight for parous females was 41.8 gm (range 33.8–50.1 gm; n = 17) and 40.2 gm for adult males (range 36.3–49.5 gm; n = 12).

Taking Kleiman and Racey's mid October average weights to represent peak pre-hibernation weights, these have been compared in Table 3 with the initial weights of the Bessacarr and Cusworth bats in order to gain an impression of the scale of weight loss these bats underwent during the hibernation period.

Table 3 Estimated weight loss during the hibernation period*

Specimen number	Sex	Weight on 6/4/1978	Estimated weight loss	Estimated % weight loss
1	♂	18.0 gm.	22.0 gm.	55.00
2	♀	25.0	15.1	36.12
3	♀	25.0	15.1	36.12
4	♀	25.0	15.1	36.12
5	♀	23.5	16.3	39.71
6	♀	21.0	19.1	45.69
7	♀	26.5+	13.6	32.54

*Calculated from mid October average weights of 41.8 gm for females and 40.0 gm for males (after Kleiman and Racey).

+ Cusworth specimen weighed on 15/3/1978.

As the Bessacarr specimens were not weighed until 22 days after removal from the roost, their weight losses, due to the trauma of roost destruction, and more particularly through being confined without food or drink, may have reduced their weight levels below normal for overwintered bats. Table 3 indicates that the female specimens could have lost from 36.12% to 45.69% of their pre-hibernation weight and the single male as much as 55%.

Table 4 Forearm lengths and weights to show weight loss during captivity

Specimen number	Sex	Forearm	Weight 6/4/1978	Weight 18/4/1978	Weight loss	% weight loss
1	♂	51.5 mm.	18.0 gm.	16.5 gm.	1.5	8.33
2	♀	53.35	25.0	23.0	2.0	8.00
3	♀	53.7	25.0	23.0	2.0	8.00
4	♀	53.8	25.0	23.8	1.2	4.80
5	♀	54.5	23.5	21.6	1.9	8.08

Table 4 shows that from 4.8 to 8.33% of body weight was lost during the final twelve days in captivity, probably indicating that these animals had been active for longer than was realised and ought to have been released earlier.

Breeding

Copulation takes place mainly in September and early October and occasionally into November and there are reports of copulation in Spring[13]. Sperm, which can retain its fertilizing capacity for up to seven months after storage by either male or female bats, is retained by the female after copulation. Ovulation and actual fertilization take place during late March and early April. Usually a single young is born after a gestation period of 70–73 days[18].

Information on breeding in Yorkshire is scant, though Whitaker's pioneer work[21] provides extensive observations on birth and maternal care. Data to hand suggests that breeding in Yorkshire takes place from mid June to early July. A female at Knaresborough which died on 28th June, 1972 was found to contain a well developed foetus (J. Mather pers. comm.). A

female collected from a roost at Stainborough on 29th June, 1905, gave birth to a single young at 5.30 p.m. the following day[21]. From the same roost, also on 29th June, Whitaker collected a young male which he variously judged to be 10–14 days old[21] and one week old[22]. Young noctules collected from a colony at Grimston Park on 16th July, 1898, were described by Oxley Grabham[8] as "dark leathery looking objects just beginning to show indications of fur". Barratt-Hamilton[2] judged them to be at least 14 days old.

Roost Sites and Roosting Behaviour

Table 5 shows that of eighteen roost sites described only two were associated with buildings whereas sixteen were in rot holes in old trees. Of the arboreal sites ten were in old beech trees, one was in an oak, five were described as being in old or hollow trees one of which was 'ivy covered'. The roost chambers investigated by Whitaker[24] all had the entrance at the bottom, "the bats crawling upwards for hiding and shelter". This was also the case in the Sandall Beat and Cusworth roosts. Discussing conditions inside summer roosts, Whitaker[23] recorded that on 1st September, 1906, "one of the hottest days I ever remember", the temperature being 94°F in the shade, eleven noctules were packed into one corner actually "wet with perspiration", yet on cold days bats had been found occurring singly.

(a) *Summer roosts*

Stebbings[18] states that in summer a number of tree holes in an area are successively used by a local population, so that the number occupying one hole is constantly fluctuating. To some extent segregation of sexes takes place at the end of hibernation, with males occurring singly or forming small groups, the females eventually establishing nursery colonies. Interestingly, of the eight fully documented summer roosts (June — September) four were of mixed sexes, three were exclusively adult male and one was exclusively adult female. Of the mixed roosts three were predominantly male and one predominantly female. Roost size ranged from one to a hundred animals, though excluding the latter very high total which appears not to have been substantiated by handled specimens, the mean roost size was about 14. Males in roosts ranged in number from singles to twenty two and females from singles to fifteen.

Stebbings[18] notes that in Autumn, individual males apparently occupy territorial 'mating roosts' between which females move. The roost located by Whitaker[23] on 5th September, 1906, containing a single male and seven females, could have been an example of this phenomenon. One can also speculate that the roost known to contain one male and five females on 15th March, 1978, could also have been an example of a territorial roost, particularly as attempted copulation was observed on two occasions, albeit long after the mating period — as currently understood — should have ended.

(b) *Winter roosts*

Whitaker[23] reports that the arboreal summer roosts he was observing were all deserted during the winter and he assumed that the bats had gathered together in large winter hibernacula in buildings rather than in trees. Although no hibernacula were actually examined he noted that "a colony apparently always occupies a certain church tower at Worsbrough Dale in the Winter for a great number of noctules may be seen flying in its immediate vicinity in early Spring and late Autumn, but not in Summer".

It is noteworthy that the largest recorded Yorkshire colony was in a building, though unfortunately the record is not dated[9]. The presence of the house mite *Glycyphaqus domesticus* (De Geer), a common species of dwelling houses, on bats from the Cusworth and Bessacarr roosts could indicate a recent removal to arboreal quarters from winter hibernacula in local buildings.

Ectoparasites

Mites, probably the most obvious of the bat ectoparasites, occur most conspicuously on the wing membranes and facial region especially on young in nursery colonies. Walsh[20] recorded

Table 5 Occupation and siting of noctule roosts

Date	Estimated number of bats	Numbers examined	Adults ♂	Adults ♀	Immatures	Site	Locality	Source
13.3.1978	10	1	–	1	–	Old beech	Cusworth (44/5403)	C. A. Howes
15.3.1978	9	6	1	5	–	Old oak	Bessacarr (43/6299)	C. Edwards
Spring 1904	20+	20+	20+	–	–	Old beech	Stainborough (44/3202)	1
29.6.1905	ca. 24	14	12	1	1	Old beech	Stainborough (44/3202)	21
29.6.1907	?	24	22	2	–	Old beech	Rockley (44/3302)	23
1.7.1905	10	9	9	–	–	Old beech	Stainborough (44/3202)	21
14.7.1908	?	11	10	1	–	Old beech	Rockley (44/3302)	23
16.7.1898	ca. 30	ca. 30	?	?	3 or 4	Hollow tree	Grimston Park (44/4941)	8
20.7.1906	?	8	8	–	–	Old beech	Rockley (44/3302)	23
Summer 1904	?	7	7	–	–	Old beech	Stainborough (44/3202)	23
Summer 1912	24	21	–	15	6	Ivy covered tree	Hornsea (54/1947)	3
1.9.1906	11	?	?	?	?	Old tree	Stainborough (44/3202)	23
5.9.1906	?	8	1	7	–	Old beech	Stainborough (44/3202)	23
-.9.1973	8	1	1	?	?	Old beech	Sandall Beat (44/6103)	11
1842	?	9	?	?	?	Old tree	Sutton (44/5512)	10
1950	over 100	–	?	?	?	Old buildings	Methley (44/3826)	9
1960 and 62	4	4	?	?	?	Mill Chimney	Halifax (44/0422)	16
1967	3	–	?	?	?	Hollow tree	Bretton Park (44/2712)	6

Note — records arranged initially in calendar order.

Leiognathus uncinatus Can. from a noctule from Helmsley. Examination of the female from Cusworth and the captive specimens from Bessacarr produced the records in Table 6. (Det. Miss B. Brewster, B.M. Nat. Hist.).

Table 6 Mites from Doncaster Noctules

Species	Cusworth Park (44/5403)	Bessacarr (43/6299)
**Glycyphagus domesticus* (De Geer)	1 ♂	2 ♀
**Macronyssus kolenati* (Oudemans)	2 ♀ 11 Protonymphs	2 ♂ 1 Protonymph
M. flavus (Kolenati)	4 ♀ 1 Protonymph	2 ♂ 3 ♀
Spinturnix acuminatus (C. L. Koch)	1 ♂	—
Macrocheles glaber (Muller)	1 Deuteronymph	—

*Not previously recorded from this host.

Walsh[20] recorded the flea *Ischnopsyllus elongatus* Curtis from a noctule from Helmsley and on 24th April, 1975, D. E. Ellis collected two males and four females of this species from two noctules from Holme Howe Wood, Bingley. *I. intermedius* (Roths.) is also recorded from a Yorkshire noctule[17] though no details are given.

The presence on the Cusworth specimen of the aphid *Myzus ornatus* Laing (Det. H. H. Martin, B.M., Nat. Hist.), normally a colonist of herbaceous plants, was no doubt coincidental.

Mortality

Stebbings[18] lists prolonged frosts and roost destruction during tree felling as causes of death. He also states that starlings drive out (and possibly kill) noctules from roost holes. Noctules in a beech tree in Doncaster were in fact ousted from their roost in Spring by a pair of starlings. The bats moved to another rot hole in the same tree only to be driven out by children attempting to set fire to the tree. The original hole was re-occupied the following season but the tree later blew down during Autumn gales.

An analysis of Yorkshire data shows that of twenty six recorded noctule deaths nineteen (73.07%) were caused by naturalists and taxidermists shooting or otherwise acquiring specimens for collections, three died of unknown causes, two died as a result of tree felling, one was a road casualty and one flushed from a roost at Hornsea in 1913 was killed by a house sparrow *(Passer domesticus)* — in addition an unspecified number of bats from this roost were shot[3].

Both diurnal and nocturnal birds of prey have been known to take bats of various species. The only Yorkshire record concerning noctules is of four adults being killed and partly eaten by a tawny owl *(Strix aluco)* with which they were placed in captivity over night[8].

Conservation

Probably the major threat to noctule populations is habitat destruction in the form of a general reduction of hardwood afforestation and more specifically the selective removal, for safety or sylvicultural reasons, of mature trees which could provide suitable roost sites. Representatives of local authorities and commercial firms engaged in tree felling operations confirm that occupied roosts are not infrequently found when removing old timber. Certainly an important feature in the conservation of these and other tree roosting bats would be the retention of dead and rotting broad-girth standing timber.

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SOME SCUTTLE FLIES (DIPTERA, PHORIDAE) FROM TOW HILL NATURE RESERVE, NORTH YORKSHIRE

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Malham Tarn Field Centre, Settle, North Yorkshire

Tow Hill Nature Reserve is situated on the west side of Snaizeholme Beck, a tributary of the Widdale Beck flowing north eastwards into upper Wensleydale (Grid ref. 34/8286). During 1976 two water traps were operated by Mr. Hugh Kemp in order to survey the Phoridae (scuttle flies). The traps were white-enamelled pie-dishes, with water plus a few drops of detergent. One was situated near the weather station and the other at the edge of a tree nursery near the house. The altitude of the traps was nearly 300 m. The initial idea of the survey was to see what Phoridae were present on the reserve and to discover something of their phenology. As it turned out 1976 witnessed the most severe drought of the century and so the phenological data obtained are unlikely to be typical.

Altogether a total of 177 specimens was procured in the traps, which were operated for three days each week. The specimens belonged to 21 species. Any catching technique is selective, and water traps are no exception. Thus of three specimens procured by direct searching along the banks of a small gill, just to the south of the site of the water traps, two belonged to species not procured in the water traps. It is clear, therefore, that the combination of the selectivity of the watertraps along with the peculiar weather during 1976 means the survey results reported below represent only the beginnings of an adequate knowledge of the scuttle fly fauna of Tow Hill Nature Reserve.

Observations

Details of the species obtained along with a synopsis of their larval natural history (when known) is given below.

Anevrina thoracica (Meigen)

A single male was procured in the third week of June. The pupae of this species have been reported from mole nests (Malloch, 1908; Lundbeck, 1922).

Conicera minuscula Schmitz

A single male in fourth week of August.

Diplonevra funebris (Meigen)

4 males in the fourth week of June; 1 male, 1 female in third week of July; 75 males, 1 female in August; one male in third week of September. The larvae are unknown but the adults have been reared from wasp *(Vespula)* nests (Collart, 1933; Collin, 1939; Schmitz, 1949; Macdonald *et al.*, 1975).

Diplonevra nitidula (Meigen)

1 female and 1 male in third week of September. This species has been obtained in emergence traps set over soil and has been reared from digested sewage sludge (see Disney, 1979). I have observed numerous females of this species swarming over a dead earthworm in Janet's Foss Wood (Grid ref. 34/9163) on 12th July 1971.

Megaselia brevicostalis (Wood)

1 male in second week and one in fourth week of May. 2 males in first week and 1 female in third week of July; 8 males and 1 female in August; 1 female in first week and 1 male in third week of September. This species is known to breed in dead snails (Lundbeck, 1922; Beaver, 1972).

Megaselia breviterga (Lundbeck)

This species was not obtained in the water traps but a female was collected from the litter layer beneath young trees on 18th June. The species has been reared from dead snails (Robinson, 1971).

Megaselia ciliata (Zetterstedt)

1 male in fourth week of June; 1 male in second week and 1 female in third week of July; 1 male in third week of August; 1 female and 1 male in third week and 1 male in fourth week of September; 1 female in fourth week of October. The larvae of this species prey upon slug eggs (Disney, 1977).

Megaselia diversa (Wood)

1 male in fourth week of August. The larvae are unknown but Colyer (unpublished notebooks) reports it reared from the nest of a blackbird and Robinson (1971) mentions the occurrence of this species in nests.

Megaselia dubitalis (Wood)

1 female in second week of June. Also on 18th June a female was collected from the litter layer beneath young trees.

Megaselia giraudii (Egger)

1 male in last week of May. This is a highly polyphagous species that has been reared from a great variety of media (Robinson, 1971).

Megaselia humeralis (Zetterstedt)

1 male in third week of July. Malloch (1906) associated this species with aspen trees infested with chrysomelid larvae.

Megaselia longicostalis (Wood)

1 male in fourth week of August and 1 male in third week of September. This species breeds in carrion of small vertebrates (Schmitz, 1938).

Megaselia pectoralis (Wood)

2 males in second week and 2 in third week of June; 3 males in last fortnight of August; 9 males and 1 female in first week of September.

Megaselia propinqua (Wood)

1 male in third week of July.

Megaselia pulicaria (Fallén)

2 males in second week of May, 2 in rest of May; 5 males in June; 1 female and 1 male in July; 1 female and 2 males in August; 1 female and 3 males in September; 1 female in second week and 1 male in third week of October. The larvae of this species prey upon eggs of spiders (Evans, 1969; Disney and Evans, 1979).

Megaselia surdifrons (Wood)

1 male in second week of July.

Megaselia vernalis (Wood)

1 male in fourth week of April; 6 males in May; 1 female and 4 males in first fortnight of June.

Megaselia woodi (Lundbeck)

2 females and 1 male in fourth week of September. Malloch (1906) recorded this species visiting decaying fungi.

Megaselia sp. 1.

A female was collected in the third week of September. This belongs to the *M. buxtoni*-complex, whose females cannot be named at present.

Megaselia sp. 2.

On 18th June a male was collected from the litter layer beneath some young trees. It somewhat resembles *M. differens* Schmitz, a species recorded from Austria. The specimen could possibly be the unknown male of *M. fusciclava*, whose female has been recorded from the Pennines (Nelson, 1971).

Megaselia sp. 3.

A male was collected in the first week of May. It belongs to the *M. fusca*-complex, which is in much need of revision.

Metopina oligoneura (Mik)

2 males in last week of August; 1 male in first week and 1 female in fourth week of September. In a mountainous region of Central Europe Baumann (1977) reported this species in vole burrows in May, June, July and August, with the peak abundance in July.

Triphleba nudipalpis (Becker)

1 female in second week of May; 1 male in second week of June. This species has been reared from a dead earthworm and dried sewage sludge (Colyer, unpublished notebooks). Schmitz (1943) records that it frequents carrion. It has been obtained in emergence traps set over soil in wheat plots (Disney, 1979).

Discussion

The species recorded from Tow Hill during 1976 represent a somewhat impoverished phorid fauna. The numbers, however, are lower than expected and this is almost certainly due to the extreme drought conditions through much of the summer. The fact that half the species are represented by a single specimen suggests that further collecting is likely to add many more species to the list for Tow Hill.

Of the species recorded at Tow Hill, the following were also recorded by Nelson (1971) at Moor House Nature Reserve: *Anevrina thoracica*, *M. ciliata*, *M. longicostalis*, *M. pulicaria* and *M. woodi*. He recorded twelve species (or eleven minus *M. fusciclava*) not yet collected at Tow Hill.

Acknowledgement

I am much indebted to Hugh Kemp, who operated the water traps.

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BOOK REVIEWS

The Moss Flora of Britain and Ireland by **A. J. E. Smith**, with illustrations by **Ruth Smith.** Pp. viii + 706, including 333 figures. Cambridge University Press, 1978. £27.50.

A new British moss flora has been long overdue: H. N. Dixon's *The Student's Handbook of British Mosses* (1924), the bryologist's bible for more than fifty years, has outlived its usefulness and the two editions (1955 and 1969) of E. V. Watson's *British Mosses and Liverworts,* whilst providing useful keys and descriptions, dealt only with the commoner species.

This new flora embodies a comprehensive synthesis of the many major taxonomic monographs, numerous cytological investigations, and extensive revisions of nomenclature undertaken throughout the world in recent years. It is a milestone in bryological studies, providing essential keys, detailed morphological descriptions and reference material for both British and foreign bryologists. Like Dixon's *Handbook*, this work will be consulted in much the same manner: the few lines in smaller type following many entries, which emphasise taxonomic, ecological or distributional points of interest, will be particularly rewarding, for the reviewer is well acquainted with the use made by American and Scandinavian, as well as British, bryologists of similar material in Dixon.

Although concise, the descriptions in Smith's work are comprehensive, following much the same pattern as Clapham, Tutin and Warburg's vascular plant flora by the same publisher, but in the former each taxon is supported by excellent line drawings mainly of leaves and their cells, and, where relevant, capsules or gemmae. Habitat sketches are provided for only a few acrocarpous mosses, e.g. *Pottia*, *Phascum*; this treatment could be profitably extended to other genera. Distributional data for the British Isles, indicated by the number of vice-counties from which a taxon has been recorded, and the world are given for each entry, together with a brief outline of the taxon's ecology.

Keys are provided to genera and species, and in numerous cases to intraspecific taxa. The introduction is somewhat brief: supplementary bibliographical material (cf. pp. 685–686) specific to the text would have been advantageous. A useful illustrated glossary and a comprehensive index including authorities and many synonyms complete a memorable volume. Author and publishers are to be congratulated on their achievements.

M.R.D.S.

Welsh Ferns, Clubmosses, Quillworts & Horsetails by **H. A. Hyde, A. E. Wade** and **S. G. Harrison.** Sixth edition. Pp. xii + 178 with 14 plates and 82 text figures. National Museum of Wales, Cardiff. 1978. £3.00.

The changes made in this new edition bring *Welsh Ferns* completely up-to-date and remove the very few points open to criticism in the last edition. The introduction is now provided with modern illustrations to replace the all-too-familiar figures borrowed from Sachs, Strasburger, etc. which have been used in so many textbooks and which served in all

previous editions of this work. The inaccurate illustration of *Selaginella kraussiana* has also been replaced. Changes in the text affect mainly nomenclature and the addition of of descriptions of 13 hybrids not covered in the last edition. One's feelings of regret at the inevitable substitution of some new specific epithets in place of such familiar ones as *Thelypteris palustris* and *T. phegopteris* is mitigated by finding *Athyrium flexile* at last given the status which it undoubtedly deserves. There is no better example in our flora of a British endemic species.

This book deserves unqualified praise. When Hyde and Wade produced the first edition 38 years ago its merits were at once apparent and we "strongly recommended" it then. Yet each successive edition has brought continuous improvements. Gerald Harrison has given the same meticulous care to the preparation of the last two editions that his predecessors gave to the earlier ones. Despite its title this is in fact a systematic treatment of *all* British species and hybrids and few botanists would disagree that it is the best available handbook on British ferns and allied pteridophytes. This new edition will enhance its reputation still further.

W.A.S.

The Tree Key. A guide to identification in garden, field and forest by **Herbert L. Edlin.** Pp. 280, including many full-page in colour by **Ian Garrard** and 8 pp. of coloured photographs (= 96 illustrations of tree boles). Warne. 1978. £5.95, cloth; £3.95, limp.

This excellent guide covers 77 genera, including 235 species, British, European and American. This makes it particularly useful in identifying the more exotic species frequently to be found in our parks and in many of the gardens open to the public, in addition to those trees normally found growing in our woods and hedgerows. The illustrations succeed in being both attractive and informative: a typical species of each genus is portrayed in full view at the top of the page, usually in its summer, autumn and winter phase, followed by more detailed portrayals of flowers, leaves and seeds across the centre of the page, and, at the foot, specialized drawings showing finer details of leafless twigs and buds, a seedling tree complete with seed leaves, and usually, a single seed. Vis-à-vis each illustration there is a clear, concise, description, which includes a note on any economic use. Introductory chapters, with keys, allow of an approach to identification via leaves, twigs, bark and timber, flowers and fruits, seeds and seedlings. Also included at the end of the book is a section of bole photographs by Maurice Nimmo; although in theory these provide an additional approach to correct identification, in practice they are too small to be really helpful. Apart from this minor quibble, the book is highly recommended. It is a great pity that the author did not live to see it published, but it is indeed, as the publishers themselves say, a fitting tribute to his memory.

V.A.H.

The Flora of West Yorkshire by **F. Arnold Lees.** Facsimile reissue with a foreword and bibliography of the author by M. R. D. Seaward. Pp. xi + 214. E. P. Publishing Ltd. 1978. £10.00.

It is now 90 years since Lees' *Flora* was issued as the second volume of the Botanical Transactions of the Yorkshire Naturalists' Union. At the time of its publication it was hailed as the most comprehensive British *Flora* to have appeared, for it covered every group of plants from Angiosperms to Algae, listing localities for more than 3100 species and numerous varieties.

The best county *Floras* are those whose authors combine expertise in the field with thoroughness in the library. Lees had both these qualities. In his active days he was a tireless and acutely observant field worker and in the gathering together of published records of West Riding plants very few items of any importance escaped him. Inevitably the *Flora* is now out-of-date, partly on account of the multitude of new records which have accrued over the intervening years and partly because there have been radical changes in the treatment of most of the so-called 'critical' general. Even so this *Flora* is still an essential work for anyone seriously concerned with West Riding plants. Not a month goes by without my having

occasion to refer to it for some item of information.

Dr. Seaward has written a new foreword in which a biographical sketch of the life and work of Dr. Lees is given and a selected bibliography of his writings. The original format has been changed by increasing the page size to accommodate four pages of the original, each reduced to about two-thirds of their former dimensions. Despite the clear printing the reduced type size is rather hard on the eyes. But it is good that this work should be available again, for second-hand copies of the original are not easy to obtain and when available are highly priced.

W.A.S.

Flowering Plants of the World edited by **V. H. Heywood** and others. Pp. 336, with many coloured illustrations. Oxford University Press. 1978. £7.95.

A lavishly-produced encyclopaedic volume compiled by 40 renowned botanical scholars under the general editorship of Professor Vernon Heywood. The systematic treatment is at family level, under which heading informative data on the numbers of genera and species, distribution (including map), diagnostic features, classification and economic uses are provided. The text is complemented by a generous coverage of illustrations combining decorative quality with scientific accuracy, in both full colour and sepia by the artists Victoria Goaman, Judith Dunkley and Christabel King. The illustrations have been carefully chosen to highlight the salient features of each of the 200 plus families covered.

Helpful introductory matter on general classification, an extensive illustrated glossary and useful index are also provided. In these days of inflation this book represents outstanding value.

M.R.D.S.

Tropical Trees as Living Systems edited by **P. B. Tomlinson** and **M. H. Zimmerman**. Pp. xviii + 675. Cambridge University Press. London. 1978. £27.50.

Unlike the proceedings of most international conferences, the papers read at the 4th Cabot Symposium at Harvard Forest Massachusetts are of considerable interest to the general reader. British naturalists have few readily available sources on the biology of tropical forest tree species and this volume goes a long way towards filling this need. Attended by almost all the experts in the field, the conference stimulated the production of numerous interesting review papers on tropical tree fossils, tree pollination, seeding patterns, the avoidance of seed predators, demography and the dynamics of gap formation and recolonization of the canopy. Along with these ecological papers, several more technical morphological and physiological topics are covered, such as studies of leaf shapes, growth forms, tree genetics, wood formation and organic matter dynamics. All the papers have comprehensive bibliographies.

Despite coming from 27 different authors, for many of whom English is not their first language, the book has been well edited and reads remarkably smoothly.

M.J.C.

The Great Yew Forest by **Richard Williamson**, with drawings by **David Kerr.** Pp. 208. Macmillan. 1978. £5.95.

This is a rather naively written book by a young man who is fortunate enough to be warden of one of the finest National Nature Reserves in southern England, including as it does the best remaining yew wood in Europe. He tells us quite a lot about himself, but what is more interesting is the account of the plants and animals of the reserve, from which it appears that unfortunately most of the less common species have declined over the past ten years.

F.H.B.

Growing Plants from Seed by **Richard Gorer**. Pp. 144, with line drawings by **Peter Barefoot.** Faber and Faber. 1978. £4.95 cloth; £2.50 paperback.

A most useful adjunct to the gardener's bookshelf which satisfies a long-felt need to have this sort of information gathered together in an easily accessible form. As more and more nurseries give up growing their own stock in the face of competition from plant centres, the

gardener is increasingly forced to raise his own plants from seed if he wishes to grow anything beyond the range of popular, easily-saleable plants, shrubs and trees. Many of these require unusual treatment if they are to germinate successfully, and as seed today is far from cheap, failure is expensive as well as disappointing.

The basic information given in the introductory chapters is sound and helpful; but it is the second half of this book which makes it so invaluable to experienced gardeners as well as to the beginner. A chapter on exceptional routines is followed by a long section on the various special treatments needed to achieve success with various plant types, including lists of individual varieties of alpine and woody plants with their particular requirements. One hopes that one day there may be a second edition with similar listings for herbaceous and bulbous plants etc., which are treated in a more general fashion. Further chapters cover seed gathering — often far from straightforward — hybridization, and plants giving unexpectedly quick results from seed.

V.A.H.

An Introduction to Population Ecology by **G. Evelyn Hutchinson.** Pp. xi + 260, illustrated. Yale University Press, London. 1978. £12.60.

This is quite the best ecology book to appear in years. It is an extremely up to date look at ecology from the viewpoint of one of the founding fathers of the modern science. The title, like much of the book is misleading: it suggests a run of the mill textbook but it is far from that. Yet it is an introduction, taking the reader from first principles right up to some of the complexities of current theoretical population dynamics.

The style is rich in historical allusions and quotations from sources so obscure as to be comical. Hutchinson turns things upside down to make a point; he tells us that the reason birds have been so frequently studied by ecologists is because both share colour vision! Unusually for a modern text, there are liberal footnotes, many so long that they oust most of the text; one page has 3 lines of text and 56 lines of footnotes, and in another place one footnote runs to two entire pages.

The chapter titles demonstrate Hutchinson's unique style and humour; (1) M. Verhulst, (2) Interesting Ways of Thinking about Death, (3) Why Do They Have So Many Children?, (4) Living Together in Theory and Practice, (5) What Is a Niche?, (6) How Is Living Nature Put Together? Aria da Capo and Quodlibet, Appendix — Ratiocinator Infantium!

By the use of carefully chosen and superbly explained examples, Hutchinson has written a book which can be read by any one interested in learning about the dynamics of populations. Despite the price, this is a book many naturalists will buy and with which few will be disappointed.

M.J.C.

Key to the Fishes of Northern Europe by **Alwyne Wheeler** and illustrated by **Peter Stebbing.** Pp. 380, with numerous maps and line drawings. Warne. 1978. £6.05, cased; £4.95 limp.

In his preface the author tells of his admiration for J. Travis Jenkin's *Fishes of the British Isles* which inspired his youthful enthusiasm for fishes. The present work is the direct successor of Jenkin's often re-printed book and will, I am sure, achieve all that the author and publisher wish for. It is a field guide in the true sense of the word with concise, lucid text accompanied by excellent line drawings by Peter Stebbing and small but useful distribution maps.

Over 350 marine and freshwater species are treated in such a manner that leaves the naturalist, angler or fish market browser with little excuse for not identifying every fish which they meet. If after using this book any doubts remain then post the fish to the author at the British Museum (Natural History) and you may have created an ichthyological record. The classification and nomenclature are up to date and it is easy to foresee that this book will have a long and useful life as an easy to use and authoritative guide.

A word of praise is due for the production: the soft binding has a wipe clean finish and the pages are well set in. Durability is an important quality in field guides as well as their users.

T.M.C.

A Key to British Freshwater Planktonic Rotifera by **Rosalind M. Pontin.** Pp. 178, with 145 line drawing figures in the text. Scientific Publications No. 38, Freshwater Biological Association, The Ferry House, Far Sawrey, Ambleside, Cumbria LA22 0LP. £3.50, paperback.

Detailed key with concise morphological and ecological data of all known British and Irish planktonic species; distributional data limited, since, according to the author, recording would tend to reflect the distribution of collectors rather than of rotifers. Good introductory matter, bibliography and index also provided.

British Freshwater Bivalve Mollusca by **A. E. Ellis.** Synopsis of the British Fauna (New Series), No. 11, Linnean Society of London. 1978. £2.90, limp cover.

This completely revised edition of the synopsis on the British Freshwater Bivalves only emphasises how well the original editions had been prepared by Mr. Ellis. The format has been completely relaid and the text fully revised and brought up to date with regard to distribution and nomenclature. Also the text figures which used to be at the end of the 1962 edition are now opposite the text, thus avoiding the irritation of having to turn constantly from the written word to the figures. This in itself makes this edition that much easier to use. I have no doubt that the new edition will soon become just as sought after as the previous ones and will, like its predecessors, become the standard reference book for all who are interested in freshwater bivalves, or freshwater ecology.

A.N.

Granivorous Birds in Ecosystems edited by **J. Pinowski** and **S. C. Kendeigh.** Pp. xix + 431. Cambridge University Press. London, 1977. £19.50.

This book, no. 12 in the International Biological Programme's synthesis series, describes the evolution, populations, energetics, adaptations, impact and pest control of the seed-eating birds.

The main co-operation under the IBP in this area was a large scale study of house sparrow and tree sparrow *(Passer domesticus* and *P. montanus)*. This book contains valuable review chapters on the variation and evolution, population dynamics, biomass and production rates of these species.

There are interesting chapters on the impact of granivorous birds in ecosystems and on the management of such pests as *Quelea*, *Agelaius* and *Psittacula krameri*. The final section by J. A. Weins and R. F. Johnstone is of considerable interest to naturalists despite its title of 'Adaptive correlates of granivory in birds'. It deals with the ecology of seed eating and the adaptive strategies of different groups of birds and presents many new examples.

The Appendices contain a wealth of data on breeding densities, egg laying, nesting mortality, fledgling survival and metabolic rates.

Keen ornithologists will find several sections of this book useful but few will be able to justify buying it.

M.J.C.

Applied Biology edited by **T. H. Coaker.** Volume III. Pp. x + 418. Academic Press. 1978. £16.80.

Further volume in this useful series (see *Naturalist* **102**: 124 & 159), containing five major papers, of which those on 'the future of pesticides and other methods of pest control' and 'heavy metal accumulation by aquatic invertebrates' will be of particular interest to the naturalist and environmentalist.

Notice to Contributors to the Naturalist

Manuscripts (two copies if possible), typed double-spaced on one side of the paper only with margins at top and left-hand at least 2.5 cm wide, should be submitted. Latin names of genera and species, but nothing else, should be underlined. S.I. Units should be used wherever possible. Authors must ensure that their references are accurately cited, and that the titles of the journals are correctly abbreviated. Tables and text-figures should be prepared on separate sheets of paper. Drawings and graphs, drawn about twice the linear size they are to appear, should be in jet-black Indian ink, and legends should not be written on the figures.

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THE YORKSHIRE NATURALISTS' UNION

THE LEPIDOPTERA OF YORKSHIRE

Separates of the collected instalments which appeared serially in *The Naturalist* (1967-1970) are available from Dr W. A. Sledge, Department of Plant Sciences, University of Leeds, Leeds 2. Price 50p plus 10p postage.

Y.N.U. NEWSLETTER

The Y.N.U. Newsletter, sent to all Full members and Affiliated Societies, is published twice a year: May and September. Its aim is to provide a means of intercommunication between all members by giving, for example, reports on Y.N.U. and Society meetings and activities, items of broad Natural History interest, details of types of surveys and enquiries. All items should be sent to the Newsletter Editor: Mr H. T. James, 238 Sigston Road, Beverley, Yorks.

LECTURING SERVICE

The Yorkshire Naturalists' Union maintains a list of speakers willing to lecture on a variety of natural history subjects. Secretaries of Affiliated Societies and similar bodies should apply to the Administrative Office, Mr D. Bramley, c/o Doncaster Museum, Chequer Road, Doncaster DN1 2AE for further details of this service.

REQUEST FOR INFORMATION: FORGET-ME-NOTS

Philip Shaw of Bradford University is researching the ecology of aquatic *Myosotis* species — *M. brevifolia*, *M. caespitosa*, *M. scorpioides* and *M. secunda.* He is eager to visit sites where these species occur and would be grateful for information reporting the location (if possible, 6 figure grid reference or sketch map) of populations of these species in the north of England.

P. J. Shaw, Department of Environmental Science, University of Bradford, Bradford BD7 1DP.

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BOTANICAL INVESTIGATIONS IN WHARFEDALE

J. E. DUNCAN

Presidential Address to the Yorkshire Naturalists' Union, Skipton, 2 December 1978

In 1950 Miss L. I. Scott was the union's first woman president and I remember well the characteristic modesty with which she opened her presidential address at Keighley. This was, I am sure, the modesty that comes of wisdom. It never occurred to me that I, one of her former students who held her in high regard, would one day occupy that same position. When I think of Miss Scott and the other botanists who have been president I find this a very humbling experience, yet at the same time an uplifting one. The honour you have done me is deeply felt and appreciated. I hope that my contribution, although less academic than many, will be of some significance to the union in emphasising the importance of collaboration between the amateurs and professionals who make up our membership, and the part played by the Affiliated Societies.

At an early age I was influenced indirectly by the Y.N.U. A friend and colleague of my aunt's, Miss D. Hilary, who was a prominent member of the union, gave me a copy of Watts *School Flora* (1927). When she took me through the dichotomous key to the Compositae to identify a daisy (my choice), I was then in blissful ignorance of the many pitfalls that family can provide for the unwary. I am sure that this initiation, coupled with earlier encouragement from my grandfather and subsequently by my botany mistress, Miss C. D. Seaton, at Otley, set me off on the right lines.

As so much of my natural history time over the last thirty-odd years has been spent in activities with the Wharfedale Naturalists' Society, this seems an appropriate occasion to give an account of ourselves, concentrating this address mainly on botanical studies.

The society, based on Ilkley, was founded in October 1945 and received much help and encouragement from the Y.N.U. The honorary secretary, C. A. Cheetham, spoke on 'The Aims and Objects of a Naturalists' Society' in the first season and came the following year to suggest 'Research Work for Wharfedale Naturalists' Society'. Members were hosts for a union field meeting at Ilkley on 6 July 1946 and have maintained a continuing association; Wharfedale naturalists have received unstinting help from Y.N.U. members through lectures, identification of specimens, advice on research and so on.

The study area recommended for the Wharfedale society by Mr Cheetham was the watershed of the Wharfe from its source to Pool Bridge, including the Skirfare and the Washburn, its main tributaries (Fig. 1). For personal satisfaction flowering plant records within the boundary were started from scratch, although reference could always be made to the wealth of past records. Miss E. M. Brown (now Mrs F. A. B. Ward) was the first botanical recorder, helped by myself, and I took over when she left the district in 1952. It is good that so many other societies and individual Y.N.U. members also enjoy the Wharfedale flora and contribute records. The area is included in the Bradford Naturalists' Society area, whilst adjoining societies are those of Leeds, Keighley, Cross Hills, Skipton, and Harrogate. In 1949 the Upper Wharfedale Field Society, based in Grassington, was founded and valuable recording is being done in the upper dale by Miss H. Lefevre and their botany group. The flora by students of the Swarthmore Educational Centre, directed by Dr G. A. Nelson (1963), includes the lower Wharfe to just beyond Bolton Abbey in the area studied.

The various boundaries which cross Wharfedale give a surprising number of connections, liaison here being important in matters of nature conservation: Leeds City Council; Bradford Metropolitan District Council; North and West Yorkshire; the Yorkshire Dales National Park, and two area groups of the Y.N.T. However, for recording purposes, the area lies within the one vice-county, V.C. 64, and flowering plant records are sent to the appropriate recorder, Mr J. R. Hickson. When the political boundaries were changed in 1974 the union agreed to continue recording on the basis of the Watsonian vice-counties of 1873 to facilitate

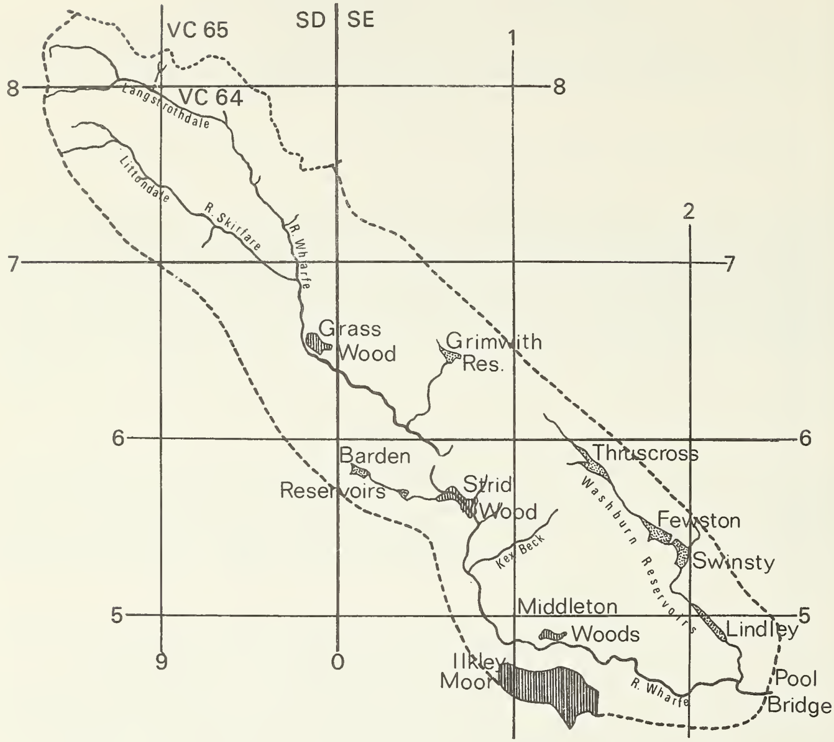

Fig. 1. Map of Wharfedale Naturalists' Society Recording Area showing 10 km grid squares, rivers and main tributaries, reservoirs, and special study areas (Crown Copyright Reserved).

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comparison with past records. For flowering plants this was in line with the decision of the Botanical Society of the British Isles.

Wharfedale provides a variety of habitats and the flora may be related to the geological features, contrasting the gritstone vegetation with that of the carboniferous limestone of Craven. This can be seen above Barden Bridge, through to Langstrothdale and beyond or into Littondale. In the upper part of the valley the Pennines are capped with Millstone Grit.

Another kind of comparison is between the flora past and present. A suitable past era for reference is the twenty or so years around the turn of the century, the early 1900s being within memory of older society members. Certain publications of the time are valuable reference sources. A glance at the map published by Smith and Rankin (1903) with an account of the vegetation of the northern district, shows it to have been a predominantly heather moor with cotton grass bog, different from the vegetation pattern found there today. As well as writing the *Flora of West Yorkshire* (1888; facsimile edition 1978), F. Arnold Lees also contributed chapters on plants for local and countryside books of the time, several by Edmund Bogg. In one (1904), Lees gave a poetic description of 'The Flower-Land of Higher Wharfe'. The section about Bolton Abbey woods suggests that, although a number of the species named may still be found there, the flowering must have been more prolific in those days. With

reference to limestone plants Lees mentions *Hippocrepis comosa*, which he calls coronation vetch; 'Hart's tongue fern of Bolton', and rusty back '. . . but to reveal the exact locations where these are at home to callers would be to say Farewell in a spirit of veriest irony'. Botanists could be wary as long ago as 1904.

In the *Flora* Lees describes *Aconitum napellus* as a 'denizen; rare, long-enduring', and for Wharfedale names Wharfe banks, Bolton Bridge and below Ilkley as localities; in Watts *Flora* Bolton Woods is given. Members of the society have found two stands of *Aconitum* on either side of the river, one a form flowering in May and the other in July, the former having narrower leaf segments. From its situation, the July flowering form, agreeing with both floras, appears to be the 'long-enduring' one, whilst the other may have been a more recent outcast. In common with several other species recorded by Lees, *Aconitum* has not lately been reported by the Wharfe near Ilkley. Similar losses are indicated in a list of flowers remembered from childhood by Mrs O. Bottomley. Nevertheless, some species have persisted and past and present records are currently being studied for the society's survey of the Wharfe riverside.

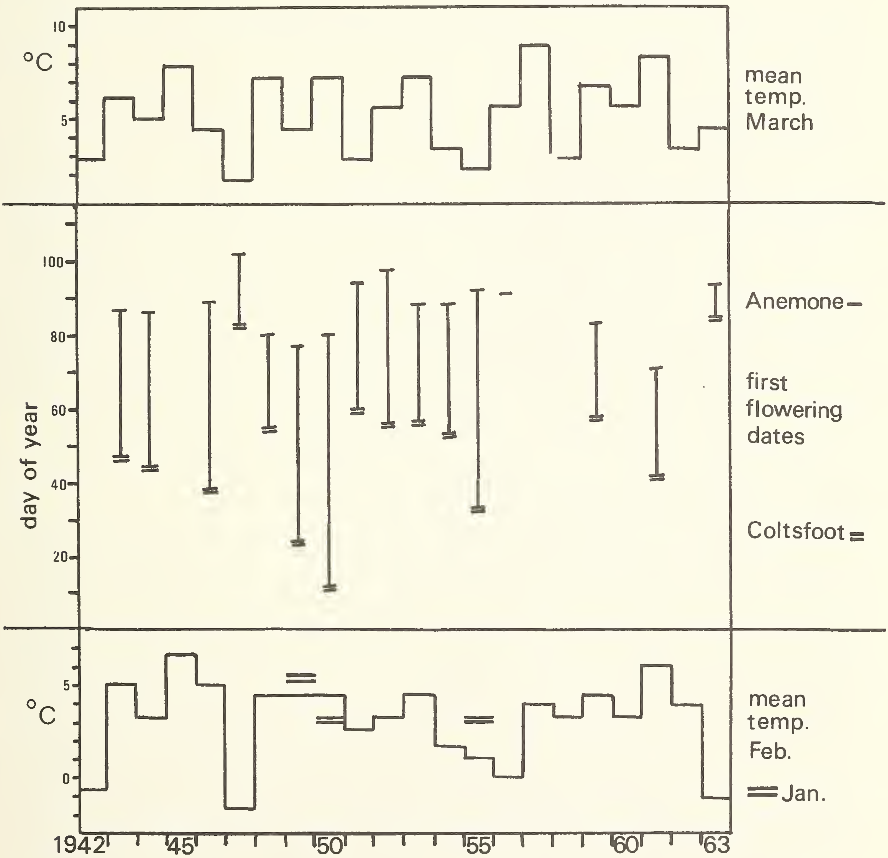

Fig. 2. Chart of first flowering dates of wood anemone *(Anemone nemorosa)* and coltsfoot *(Tussilago farfara)* with mean temperature graphs for March and February, 1942–63.

By the banks of the Wharfe in Strid Wood, Bolton Abbey, a number of calcicoles contribute to the flora and give a foretaste of what is to be found higher up the dale; there are three types of habitat: splashed rocks near the Strid, sandy deposits by the river's edge, and outcrops of limestone extending across the river. *Thymus drucei* by a small limestone outcrop in the field and *Sesleria caerulea*, a species being studied by Mrs J. Dixon of Bradford University are two examples of calcicoles. Society members have a continuing interest in Strid Wood and were able to contribute notes on the social history, geology, animals, and plants when the nature trails there were being laid out by the Bolton Abbey Estate.

The society's flowering plant index was started in a stimulating way by recording first flowering dates year by year for each species. This engendered healthy competition among members to be the first to see a flower out — 'stamens must be showing' — and encouraged the habit of noting the locality and date of observation. Thus a small contribution could be made to phenology, defined as the study of the times of recurring natural phenomena especially in relation to climatic conditions. The Royal Meteorological Society produced an annual Phenological Report throughout the 1900s up to 1947. Those for 1948 and 1949 were probably not published and phenological recording was suspended in 1950 (pers. comm.). Information on dates of flowering, tree leafing, fruiting and leaf-fall, Lepidoptera records, and bird migration dates was required. These were contributed by observers all over the country, which was divided into areas of similar climate for making realistic comparisons.

Mr W. F. Fearnley, a Y.N.U. member of long-standing, had already begun sending in flowering records for Ilkley in 1942 and he and others in the society continued to do so.

Correlations between flowering and climate can be discovered only if the observations are made in the same place for each species every year. In the Y.N.U. Botanical Section some of this had been done by individual members, including C. A. Cheetham at Austwick, whose assessment of flowering and plant growth related to Yorkshire's seasonal weather were prominent features of the annual report when he was secretary of the section. This practice was continued by later section secretaries, Miss C. M. Rob and Miss D. R. Walker. Such reports are of value in indicating general trends and for comparison with similar weather conditions in future years, and are well worth preserving.

There are difficulties in treating phenology as an exact science. Writing of the weather, J. A. Butterfield (1934) said that there was 'little attempt to correlate records with the weather, the prime cause of their variation'. Later observations were contributed by W. E. L. Wattam and A. Malins Smith. In 1948 a Phenological Committee under the presidency of Mr Wattam was set up and began working on similar lines to the Meteorological Society. Unfortunately its beginnings coincided with the demise of that society's report and phenological recording was discontinued.

For Wharfedale it has been interesting to look back at the early records and test whether there is any correlation between flowering dates and the weather conditions. Ilkley weather records are available by courtesy of the local authority and Mr A. C. M. Duncan keeps the figures and publishes these as a report along with his personal observations in the society's annual *Transactions.* Two spring-flowering species were selected, wood anemone *(Anemone nemorosa)* and coltsfoot *(Tussilago farfara)*; Fig. 2 shows graphically the first flowering dates of the species from 1942 to 1963, using reliable records only. A wider range of coltsfoot flowering dates than those of anemone, and a relationship between flowering and temperature for both species are suggested. Clearly shown are the cold winters of 1942, 1947 and 1963 when the snow and frost-bound earth delayed flowering of coltsfoot until March; the January temperatures are added for 1949, 1950 and 1955 when unusually warm days brought the plants into flower that month or early February. The relationships are better shown by scatter diagrams (Fig. 3), the mean temperatures being plotted against flowering date (in the case of coltsfoot omitting the years noted above). The position of the points is not random and both diagrams indicate a negative linear correlation, that is, the higher the temperature, the lower the day number and vice versa. One of the tests for a closer estimate of the relationship is to calculate the correlation coefficient *(r)*, which runs from −1 for perfect negative correlation (points appearing in a straight line), through 0 for no

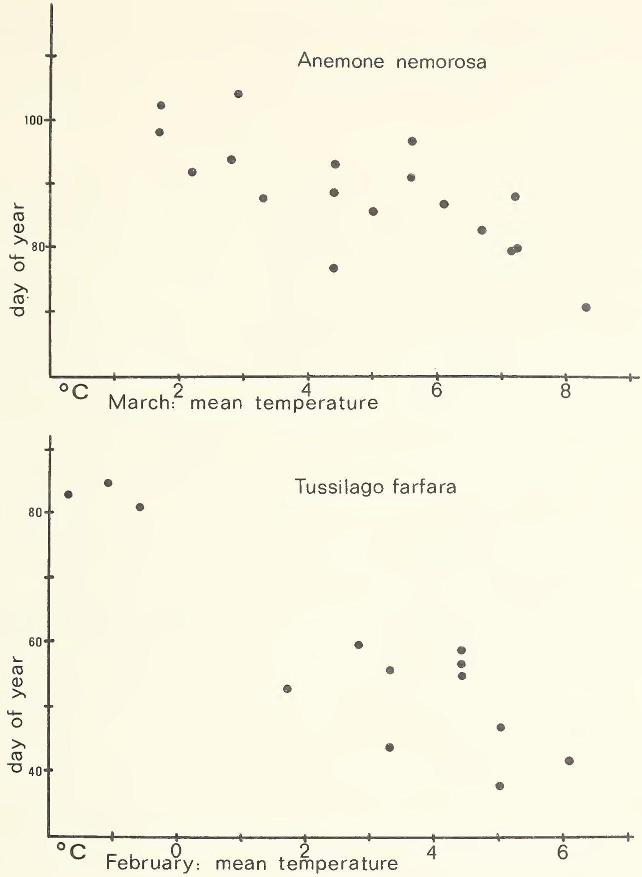

Fig. 3. *Anemone nemorosa* and *Tussilago farfara*: scatter diagrams for flowering date versus mean temperature of flowering month.

correlation, to +1 for perfect positive correlation. The results were: coltsfoot, $r = -0.87$; anemone, $r = -0.75$ (Fig. 3).

Although the mean monthly temperatures appear to be related to the flowering of the two species, day by day observations of temperature and perhaps sunshine during the period prior to flowering might give more relevant information about the conditions which bring these plants into flower.

Naturalists in Wharfedale are fortunate in being near to Keighley where at Cliffe Castle Museum the West Yorkshire Regional Data Bank has been established, the first of its kind in the country outside Monks Wood. Mr J. C. Lavin, Director of the Data Bank finds there is scope for interchange between amateur and professional naturalists. Owing to the need for the latter to make their fieldwork cost-effective, he and his assistant, Mr G. Wilmore, record vegetation on a habitat basis and cannot spend time making full lists of species. Those whose fieldwork is a hobby can fill in gaps by supplying records and in return receive valuable data from the computer applicable to their research.

When the mapping scheme began the Wharfedale naturalists took part, concentrating on the south-eastern half of the area. It will be seen from the map that no single 10-km square lies entirely within the society's area, so that reference to the *Atlas* (Perring and Walters, 1962; Perring, 1968; Jermy *et al.*, 1978) does not give certainty of the presence of a species. For indicating local distribution a smaller unit such as a 2 × 2 km square or tetrad is required, as is in use for the society's riverside survey of the Wharfe.

Recording at this level has been stimulated by the Y.N.U. Flowering Plant Section's scheme for tetrad mapping of the common plants since 1971, organised by Mrs D. E. Haythornthwaite and myself. Botanists in affiliated societies taking part have looked more closely at their own areas and produced, as well as records for the specified list of 120 common plants, additional lists for the files of the vice-county recorders.

The Harrogate and District Naturalists Society has gone one step further. Under the direction of Mr W. H. Jowsey, members have produced a complete set of species distribution maps of their society's recording area on the basis of a 1 × 1 km grid square (Jowsey, 1978). The recording covered the years 1966 to 1977 and five-yearly revision of the maps is planned.

For still more detailed distribution studies of species or habitats, grid squares drawn on a map are not always easily related to the ground, nor are they necessarily relevant to the study. Grass Wood, which includes both Forestry Commission land and Y.N.T. Reserves, is an example where this method has not proved feasible. It has been found more practicable to use the system of compartments delineated by footpaths, already worked out for the bird and mammal surveys. The forty-four compartments are not difficult to identify so more people can help with recording. The species table and compartment card index for habitat and other notes devised by Miss Lefevre and myself are satisfactory for documenting the flora of the wood and comparing vegetation in the forestry and reserve areas.

Plant mapping for the grid square SE/15 led to recording by the Washburn reservoirs and permission was obtained to work on the shores of Swinsty and Fewston. The report was published in *Naturalist* (Duncan and Dalby, 1960). This was the first special study I did with my friend and mentor, Mary Dalby, and here I record that I dedicate this address to her memory. Her work in the Y.N.U. Bryological Section is well known; her initiative and leadership inspired the Wharfedale naturalists to achieve far-reaching results in ecological investigations.

The need for work in ecology has often been expressed in the Y.N.U. During the 1930s the Ecological Committee of the Botanical Section worked on a major project concerned with Juniper on Moughton Fell, and were responsible for providing ecological reports for several field meetings. This committee was commended by Dr Versey, who suggested that the union should take a central area of varied topography for study, remembering that vice-county boundaries were not necessarily coincident with ecological boundaries. Dr W. H. Pearsall strongly advocated the ecological approach and in 1942 said the Y.N.U. was fitted for such surveys, although distances could cause problems. The existing Committee for Research, under the chairmanship of Professor J. H. Priestley, made a plan for ecological work on a detailed study of heather moor. At the Whitsuntide field meeting in 1942 at Horton-in-Ribblesdale a preliminary study on these lines was begun.

Members of Bradford Naturalists' Society were those who most thoroughly followed up the union's plan with their studies of heather moor at St. Ives, Bingley, led by Mr Malins Smith and Miss Hilary. Reports of their work appeared intermittently in *Naturalist* from 1945 to 1952.

Thus, there was both an example to follow and the published results of moorland study in the vicinity for reference when Mary Dalby posed her problem to the Wharfedale naturalists in 1959. Put briefly the problem was to find what factors were responsible for the phenomenal increase of crowberry *(Empetrum nigrum)* and the decline of heather *(Calluna vulgaris)* on Ilkley Moor over the past fifty years, whereas heather had remained extensive on the adjoining moors.

The society's survey of Ilkley Moor started the same year, covering Ilkley and Burley Moors, the part of Rombalds Moor enclosed by the Ilkley Urban District boundary. The survey reached its first milestone in late 1960 when an exhibition was staged and given a

second showing at the union's A.G.M. held in Ilkley that year. Fortuitously, the theme fitted in with the subject of the Presidential Address by Dr D. H. Valentine who commended the society on its work. The authors of the papers cited below were the chief workers on the project as it continued in following years, but many more members had become involved and contributed a wide variety of talents; acknowledgement of their expert help and advice is given below.

Little was found in the literature about the ecology of crowberry, so it was decided to publish a report of observations on this species at the outset (Dalby, 1961). This was the first of a series of papers by members appearing in *Naturalist*. *Empetrum nigrum* has since been researched for the *Biological Flora* (Bell and Tallis, 1973). As reference may be made to all these papers, the present account is confined to more recent work, of which three aspects are selected, viz: recolonisation, some less frequent species, and bogs and flushes.

The study of recolonisation of accidentally burnt areas on the moor had provided information about the growth habits of crowberry and heather. This was a useful reference in relation to a more recent disturbance. Before the gas pipeline trench was dug over Ilkley Moor, the North Eastern Gas Board sought local knowledge. It was satisfactory that the proposed line was modified in the Green Slack area to avoid an important archaeological site. The naturalists knew of no habitat or plant demanding protection, but were concerned about the restoration of the moorland vegetation. After the pipe had been laid the strip was seeded with an officially recommended seed mixture in 1971 and fenced off for a period.

The route of the pipeline is N — S right across the valley and on the moor continues S.W. from the road crossing the gritstone escarpment, then over the plateau where there are good patches of *Calluna* with some *Empetrum*. After traversing a wetter area the line cuts across Lanshaw Delves, goes over the cotton grass bog and so to the boundary via the higher plateau. By 1978 the cotton grass bog which overlies a band of shale had become restored to its original state. Lanshaw Delves is a glacial moraine once extensively dug for limestone, small pieces of which have been unearthed by the excavation, but no calcicolous plants have been found at this point. Apart from the bog, the line remains as a broad band of grass prominent amongst the other vegetation.

Sheep grazing has been a significant factor in the vegetational changes on the moor, but fewer sheep are put on now than when the survey began and heather was suffering from overgrazing. The gas pipeline has attracted sheep and they appear to be feeding only on grass, leaving the nearby heather alone. Observations of crowberry and heather colonising bare peat showed that crowberry which is not grazed is the more successful coloniser with its extensive vegetative growth; indeed its presence may have reduced peat erosion on exposed areas. Heather, on the other hand, produces abundant seedlings which are pulled up by sheep and any plants becoming established are closely nibbled. On the gas pipeline reseeding would be necessary to cover the ground and prevent erosion, so the conditions for plants to recolonise from the original vegetation were different from those on bare peat. Crowberry plants have to some extent grown in from the side but not with the same rapidity as over bare peat. Heather seeds blown over from the adjoining patch have germinated amongst the grass and the two together do not appear to have been grazed. There is a slight extension of bracken below the escarpment on to the pipeline. It remains to be seen whether the original pattern of vegetation will be restored and if so how long this will take. Examination of the line on Denton Moor where there is more heather will be profitable. The press officer of the gas board has said he would welcome observations and it may be that other societies could make similar investigations if they have had gas pipes laid in their areas.

One new species which has appeared on the pipeline is *Aira caryophyllea*, recorded in Lees' *Flora* for Rombalds Moor as a whole but not included in his Ilkley list. Its presence now is less likely to be confirmation of an earlier record than introduction with the seed mixture which could also account for the appearance of several fungi new to the moor at this site.

In studying plant communities (Fidler *et al.*, 1970) it was observed that the number of vascular plant species occurring within the defined communities was very small (23) even for an acid moor, compared with the total list of about 180. This is partly accounted for by

introductions as above, and casuals and common species not typically of moorland found near the northern perimeter of the moor.

On the moorland itself some woodland relics such as *Teucrium scorodonia* add to the list. Other evidence of former tree cover on the moor comes from the discovery of birch wood preserved in peat, pollen analysis and the suffix *-shaw* in some of the names, a derivation of *sceaga* meaning a copse. These are all exemplified by Crawshaw Moss, an active peat bog on the west of the moor, where a survey was done by Dr and Mrs J. H. Fidler and the pollen analysis by Dr D. D. Bartley.

A number of species more typical of limestone districts grow in places of higher pH. Calcareous sources on the moor have been enumerated by Mr P. D. Lamming (1969).

Notes on a few of the less frequent species will illustrate how their status has changed since 1885.

Thymus drucei seems to have been more widespread; it is now known only on Woofa Bank, a glacial moraine smaller than Lanshaw Delves which probably suffered less disturbance. On the Delves *Campanula rotundifolia* and *Euphrasia confusa*, two species not strict calcicoles, are established, although stunted due to grazing, in the dry and poor fertility conditions they favour. *E. confusa* was determined by Dr P. F. Yeo, who says it is the prevalent Pennine species characteristic of short turf (pers. comm.); the record is new to the 10 km square in the *Critical Supplement.*

Three confirmation of past records are: *Trientalis europaea*, *Melampyrum pratense* and *Succisa pratensis.*

Locations for *Scirpus setaceus* are given by Lees as the 'moor slope rills'. Miss N. Saunders has described these rills as many little streams banked in places by bushy heather plants. Since then a number of springs have been diverted underground for the water supply and the dry slopes of today are very different. *Scirpus setaceus* is confined to wet ditches beside main footpaths.

Narthecium ossifragum was described by Lees as present on the moor but 'gradually getting scarcer, according to Dr J. Willis'. The situation now is that only non-flowering remnants are found in some of the *Sphagnum* bogs, but there is one bog on the moor and part of a smaller one nearby where the plant flourishes and flowers well. Information through Mr Lavin from the Data Bank shows that there are only four other similar sites in the Bradford Metropolitan District.

The *Sphagnum* bogs, flushes and streams were not included in the plant communities and some of the rare or infrequent species of these habitats recorded during the course of the survey are: *Potentilla palustris* (non-flowering plants), *Chrysosplenium oppositifolia*, *Drosera rotundifolia*, *Anagallis tenella*, *Menyanthes trifoliata* (non-flowering), *Myosotis stolonifera*, *Pinguicula vulgaris*, *Valeriana dioica* (rare in 1885), *Listera ovata*, *L. cordata*, *Dactylorhiza maculata*, *D. fuchsii*, *Carex pulicaris* and *C. dioica*. *Valeriana dioica*, *Listera ovata* and the last three are examples of species which will not tolerate very acid conditions. It is suggested that leaching is responsible for the loss or reduced frequency of calcicoles in drier places, whereas in the bogs and flushes the drying out of the moor may be a more significant factor which reduces the size of such habitats. Certainly those bogs and flushes fed by springs coming from a calcareous source in the ground are of ecological importance.

Mary Dalby (1973) was aware of the threat to the small bogs and flushes of the moor when she studied in detail twenty-two of these sites in 1972. She was able to relate the species of *Sphagnum* present to the pH, in some cases finding a definite zoning of species according to pH. Lists of vascular plants in the various bogs are in the moorland records, but now an attempt is being made to find out if the distribution of the higher plants in the bogs shows any similarity to that of *Sphagna.*

I discussed the problem with Dr D. D. Bartley, who has advised the society throughout the survey, and he suggested so-called hypothesis generating techniques using two different computer programs. For this preliminary investigation three of the twenty-two sites were examined by Dr Bartley and myself.

Half-metre quadrats with a grid of 100 squares were employed to record the presence or absence of each species, including mosses and liverworts, in every small square; the values

per quadrat ranged from 0 — 100, and could be used as presence or absence of species (program 1) or converted to a 0 — 10 scale (program 2).

The sites chosen were:

	quadrats	pH range
Quarry Bog (no. 2)	1 — 6	5.0 — 5.7
Weary Hill Flush (no. 1)	7 — 16	3.1 — 6.4
White Wells Bog (no. 11)	17 — 24	3.4 — 6.4
Total number of quadrats or stands (individuals)	= 24	
Total number of species (attributes)	= 59	

Program 1. Chi-square test.

The results from the computer are summarised as follows, quadrat numbers in parentheses:

All quadrats (1 — 24) maximum chi-square = 12.69, corresponding to *Lotus uliginosus* and *Lysimachia nemorum* both in (17, 18) only.

Sub-division on attribute *Potamogeton polygonifolius* in (1 — 6) only

separates . . . Quarry Bog

Quadrats (7 — 24) maximum chi-square = 10.87, corresponding to *Equisetum palustre* (17 — 24) only and *Eriophorum angustifolium* (7 — 16)

Sub-division on attribute *E. palustre*

separates . . . White Wells Bog

Sub-division within White Wells Bog on attribute *Anthoxanthum odoratum* separates it into two, (17 — 20) and (21 — 24)

Remaining quadrats (7 — 16) . . . Weary Hill Flush.

The maximum chi-square value is seen to decrease as the number of quadrats involved is reduced showing closer relationship within the smaller sets of quadrats. The three sites chosen are shown to be distinct. However, the sub-division in White Wells Bog is interesting. Early on in the survey this bog was discovered to be less acid than the immediately adjoining one to the west, owing to being fed by a spring of higher pH. A number of species less tolerant of acid conditions are found to grow there. This division of the stands into two groups shows some relation to the pH in the quadrats, tabulated as follows with the relative abundance of the three significant species:

Quadrat number	17	18	19	20	21	22	23	24
pH	3.9	4.7	5.7	3.4	6.3	5.8	6.4	5.9
relative abundance:								
Valeriana dioica	—	2	—	—	23	11	36	22
Juncus effusus	3	—	7	12	—	—	—	—
Anthoxanthum odoratum	10	12	5	6	—	—	—	—

Program 2. Principal components analysis.

Principal components analysis can be used as an exploratory technique with complex data where the controlling ecological factors are not fully known. It is concerned with the distribution of stands of vegetation relative to the axes of greatest variation within the data. The computer produces a matrix of correlations between stands and then the matrix is analysed to find linear combinations of variables. The first principal component is the combination with the maximum variation within the data, (a simple example would be water content of the soil, which if it ranged from a wet to a dry region could account for most of the variation). The second component is a linear combination uncorrelated with the first, with as large a variance as possible and so on, until the variance is of little or no significance.

The components are printed out as Eigen values. These are printed in columns each giving the position of each stand along the axis of variation. To show this graphically the axes are taken in pairs; the figures in the first column are plotted on the vertical axis against those in the second plotted horizontally. The stands are represented as points on the graph and the spacing and arrangement indicates the relationship between them.

This is probably the best method of stand ordination and the first two axes are often related to variations in species richness. The worker must correlate the axes with environmental characters and great care is needed to avoid misinterpretation.

Fig. 4 shows the first of the graphs for the present study (it is not usually necessary to take pairs of axes beyond the first four). The stands (quadrats) appear spaced in their sites, according to their floristic composition, and the division in White Wells Bog is again shown. No clear-cut relationship with pH is evident and in any future work other edaphic factors must be determined.

Data from three other bogs on the moor have been obtained by Mrs D. Marjoram and myself and we hope to continue on the lines indicated. It is a privilege for the society to have the help and advice of Dr Bartley with the computer program, for it is only by collaboration with someone who has the facilities and skill for using computer techniques that this kind of study can be done by amateurs in a local society.

The greatest satisfaction is derived from ecological studies if they arise from some problem or need. This has been the case with the moorland survey and another instance arose in 1967. Middleton Woods, Ilkley, the property formerly of Ilkley Urban District Council and since 1974 of Bradford Metropolitan Council, are designated as an amenity area, being of mixed hardwoods supporting a wide variety of wildlife, with bluebells as their special attraction.

Early in 1967 members of the society were concerned to find that an area of approximately one hectare made into two enclosures had been cleared and felled except for a few large trees, and closely planted with conifers and hardwoods, mainly sycamores. The conifers were to be removed after ten to fifteen years. This was more like forestry practice than management to conserve the best habitat for bluebells, that is, an oak-bluebell association (Blackman and Rutter, 1956). After discussion between representatives of the council and the society it was agreed not to repeat this method for maintaining the woodland. In 1978 Bradford Metropolitan District Council engaged an ecologist to prepare a management plan for the woods. For this reason the society's views will not be discussed here.

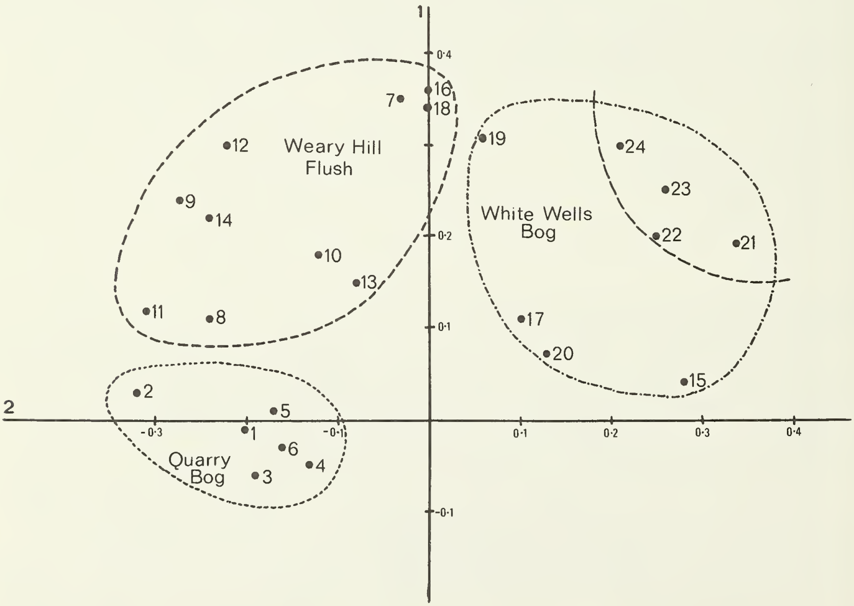

Fig. 4. Principal component analysis of data from three bogs on Ilkley Moor (see text).

The survey of Middleton Woods by the society includes history, geology, recording of plants and animals, counts of trees and their distribution, study of natural regeneration and bluebell habitats. Unlike Grass Wood, these woods (Coppy Wood to the west and Hudson's Wood to the east, separated by Curly Hill) can be studied fairly easily using a grid system. Mr G. R. Bottomley prepared a map with grid squares 100 metres apart for reference and plans for work were drawn up by Miss Dalby and Dr and Mrs Fidler. The tree counts revealed a good spread of oak with some natural regeneration, but a disturbing proportion of sycamore regenerating prolifically.

It was decided to monitor bluebell growth in the replanted enclosures. For this a fairly simple method of counting annually the numbers of bluebell inflorescences in one-metre quadrats was devised, initially taking the mean of ten separate sets near conifers and near sycamores in four divisions of the enclosures. As a standard for comparison the process was repeated in other parts of the wood under different trees:

Tree cover	*Bluebell inflorescences/m²*
Silver birch	(1) 25.4 (2) 30.3
Conifers	24.0
Sycamore	(1) 130.6 (2) 61.6
Oak (young)	83.3
Oak (light shade)	186.3
Oak (heavy shade)	147.5

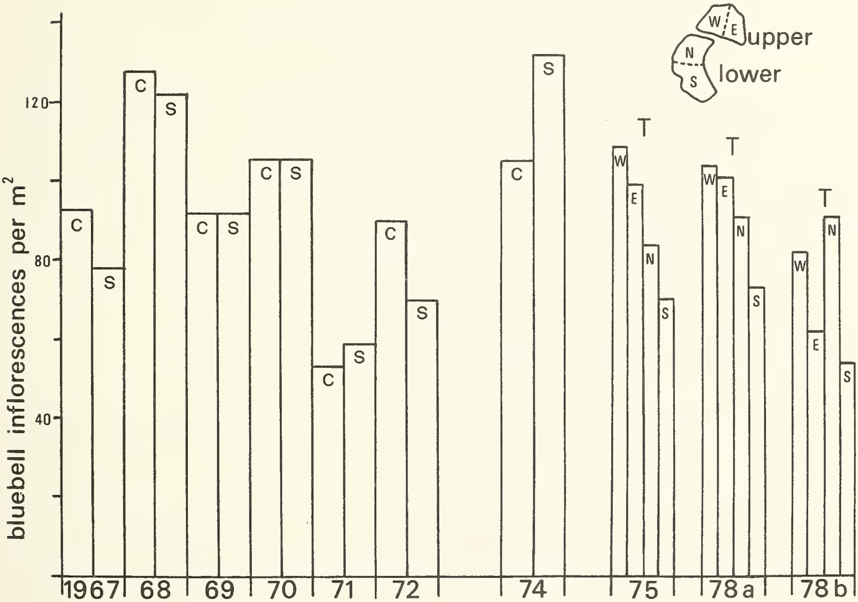

Fig. 5. Histogram showing densities of bluebells *(Endymion non-scriptus)* in replanted area of Middleton Woods, Ilkley.
1967–74 C— average density near conifers
S — average density near sycamores
1975 and 1978 T — random quadrats in the four divisions indicated on plan (W, E, N, S). 78a results from all quadrats and 78b results excluding quadrats under established trees, examined in 1978.

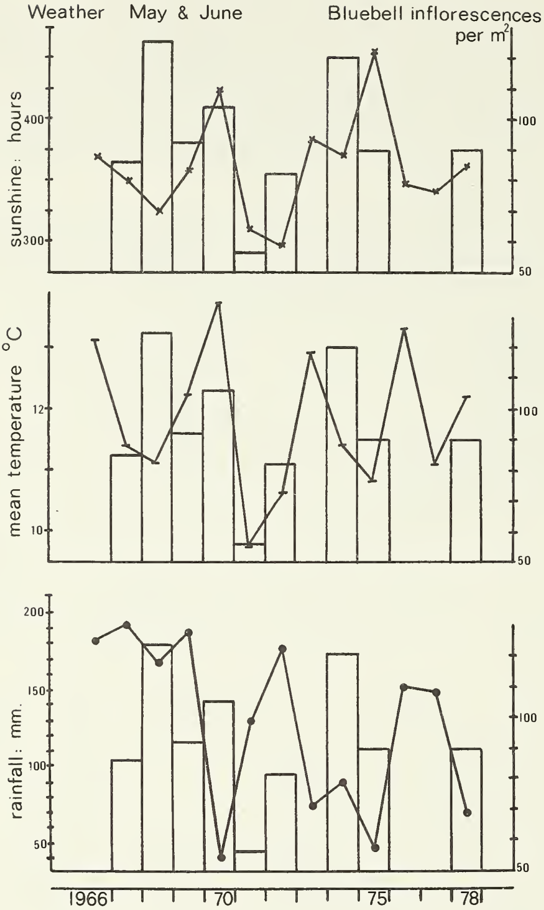

Fig. 6. Graphs of sunshine, mean temperature and rainfall for May and June 1966–78 superimposed on histogram of bluebell densities in replanted areas of Middleton Woods.

By 1975 the increased growth of trees made it impossible to follow the original lines and random quadrats were substituted. In 1978 the bluebell counts were done by Mrs D. Marjoram, Mrs G. Wooliscroft and myself and it was decided to examine closely the results so far and consider what further study in the woods as a whole would be profitable.

The bluebell density estimations are shown in Fig. 5, averaged for 1967–74 but keeping conifer stands separate from those near sycamores. There is only slight difference between these as the trees have not grown up sufficiently to influence bluebell growth with the unfavourable factors of increased shade and accumulation of leaf litter. It was expected that this monitoring would take several years and that the result would be a decline in bluebell density, but the marked fluctuations in density during the first seven years pose some interesting questions. On inspection it seemed that climatic factors might be responsible, but the relationship is by no means simple. The weather figures for May and June, the months of

greatest bluebell activity are superimposed on a simplified histogram of bluebell density (Fig. 6). The big increase in 1968, the year after clearing, agrees with similar observations in other places, but that in 1974 appears to be more closely associated with the weather as could also be the marked decrease in 1971. These two years are remembered as 'good' and 'poor' bluebell years respectively. Mathematical tests on the figures have shown that correlation between flowering and weather conditions cannot be ruled out, but the data are insufficient for satisfactory conclusions to be drawn. The site in any case is not a suitable choice for investigation of weather-related growth of bluebells which was not in the original enquiry. Nevertheless, the results have suggested an interesting possibility for future work in other parts of the woodland less liable to suffer changes in tree cover.

By 1978 the results of monitoring bluebell density in this replanted area were beginning to show change as tree cover became closer. Owing to taking random quadrats, it was realised that in 1978 some of them had fallen under established trees and when the estimation was made excluding these, the figures were lower. Moreover, a distinct decline in bluebell density was indicated in the southern half of the lower section, observed to be the most shaded part of the plantation. The retention of some larger trees may have prevented too great a loss of bluebells.

The richness of the flora and fauna in Middleton Woods makes them a place to enjoy at all times of the year and the society's nature trail booklet is a guide available to the public. Similarly, the booklet for Ilkley Moor, the guide to nature walks by the riverside and two geology trails also help to spread interest in natural history in the Ilkley area. For more specialised naturalists there is always research to be done and discoveries to be made. Long-term surveys of the kind described above are ideal for a local society when the results can be documented for future members who no doubt will in turn find environmental changes for investigation.

I will close as I began, on a personal note. Events of the last four Saturdays of a very happy year for me symbolise what I believe in for the Y.N.U. First was the Ornithological Section which was very well supported by both full and affiliated members. The following Saturday I had the honour of unveiling the Catherine Muriel Rob Memorial Gate at Ashberry Y.N.T. Reserve. It is good that the union and the trust have combined in this tribute to a botanist who won the love and esteem of members of both organisations and inspired so many to learn and appreciate botany. Present members must follow the example of former members who have served the union. The third event was the Y.N.T. meeting for Chairmen of Reserve Management Committees; helping in reserves is a very practical way of co-operating with the trust towards the conservation of those places where we, as naturalists, find so much to enjoy.

Finally, for today, I believe that with the full support of its members and the Affiliated Societies, the Y.N.U. will go from strength to strength.

ACKNOWLEDGEMENTS

The thanks of the Wharfedale Naturalists' Society are due to Dr W. A. Sledge and to Dr D. D. Bartley for their unfailing help and guidance, and I add my personal appreciation.

For their help and advice I thank Miss E. Crackles, Mrs D. E. Haythornthwaite, Mr J. C. Lavin, Miss H. Lefevre, Dr F. H. Perring and Dr M. R. D. Seaward. Many members of the Wharfedale Society have taken part in the studies which have been described and I thank them all, especially Dr and Mrs J. H. Fidler, and Mrs F. A. B. Ward, who have left the district but maintain their interest in the work; those members mentioned in the text; and Mrs F. C. Draper, Mr J. R. Thackrah, Mrs N. Watson and Miss R. M. Young.

My thanks go to my family, especially my husband, Colin; my sister, Margaret Kennedy; and nephew, David Kennedy, for his invaluable help with the mathematical applications.

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OBSERVATIONS ON *LAGENORHYNCHUS ACUTUS* STRANDED ON THE YORKSHIRE COAST

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INTRODUCTION

Lagenorhynchus acutus, the white-sided dolphin, is a northern Atlantic species considered boreal in its distribution. In Britain it is known from infrequent strandings, only twenty-four cases having been reported since 1913, mostly from Orkney and Shetland (Fraser, 1976). It is considered sympatric in its distribution with *L. albirostris*, though differing from the latter in behaviour and food preferences (Gaskin, 1976).

During early April 1978 a young male white-sided dolphin was stranded on the estuarine side of Spurn Head, Yorkshire; the measurements are provided in Table 1. The dolphin was later examined at Cambridge.

The relatively fresh condition of the carcass provided detailed information on body pigmentation patterns, particularly those of the head, which were recorded photographically when the skin was wet. A post-mortem was subsequently undertaken and the results are discussed here in relation to the possible causes of the stranding. Stomach contents and parasites were identified by the British Museum (Nat. Hist.) whose help is gratefully acknowledged.

OBSERVATIONS

1. *Body pigmentation — morphology and functional aspects*

Lagenorhynchus acutus is strongly fusiform in body outline (Figs. 1 and 2), the sleek lines of this species contrasting with the deeper bodied form of *L. albirostris.* The dorsal fin is centrally placed and from behind it the body tapers to a strongly keeled tail stock, a distinctive feature of this species. The short snout with its broad dorsal aspect is characteristic of the genus (Fraser, 1965).

Complementary to the streamlined body form is the complex skin pigmentation pattern. The dorsal body surface is of a deep blue-grey hue in air, and appears black when wet. Ventrally the skin is unpigmented and appears white.

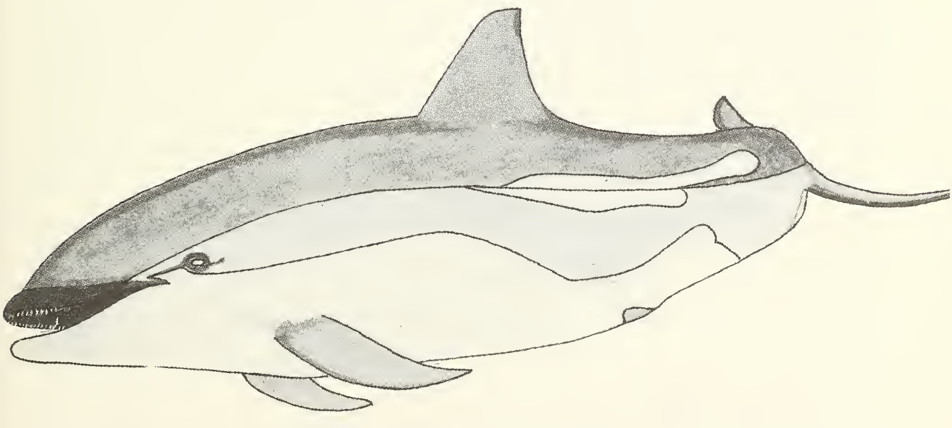


Fig. 1. *L. acutus*, 241.5 cm ♂, Spurn Head specimen. The white marking, which gives this species its name, is the lower of the two flank streaks.

The dorsal pigmentation is subdivided approximately equally into two longitudinally running bands, the upper more darkly pigmented than the lower. Both dorsal and ventral surfaces of the pectoral fins and a small crescentric area either side of the genital slit are of a similar dark hue.

A pair of closely opposed longitudinal pigment streaks form a dichromatic stripe that lies on each flank, reaching from below the dorsal fin to the tip of the tail. The upper streak is longer and buff coloured, whilst the lower is whitish and reaches only half the length of the former. This double stripe is notable in the sharpness of its definition and high degree of contrast against the surrounding pigment. It serves as a valuable recognition mark for this species at sea (Fraser, 1946).

In the head region (Fig. 1), the skin over the upper jaw is darkly pigmented and joins posteriorly with a thin black line of pigmented skin, which is seen to recurve upon itself before expanding to form a black pigment ring around the eye. The small tongue or 'patch' of skin enclosed within the margins of this eye line and eye ring is white. It is an extension of the white ventral skin interposed between the jaw and eye, whose contrast is sharply enhanced by the black margins formed from the eye line and ring. A thin black pigment stripe connects the opening of the external auditory meatus to the base of the eye ring.

A comparison with the Shetland specimen described by Harmer (1919), Jonsgard's (1952) plate of a Norwegian specimen and the Newfoundland specimen figured by Mitchell (1970), indicates that the arrangement of eye markings described here is a constant feature of the head pigmentation of this species.

Table 1 External measurements (point to point: cm) of *L. acutus*

Rostrum tip — fluke notch	241.5
Rostrum tip — blowhole (ant. edge)	30.0
Rostrum tip — auditory meatus	35.5
Rostrum tip — eye (centre)	29.0
Rostrum width (max.)	12.0
Eye — gape	6.0
Eye — auditory meatus	6.0

2. *Nature of stranding and death*

Many factors have been implicated in the stranding of cetaceans. Parasitic nematodes associated with the ear sinuses of odontocetes are now frequently considered to cause disorientation and stranding. Parasitic infection was not found to be heavy in this dolphin. Nematodes *(Anisakis simplex)* were common but not abundant in the forestomach and two species of cystic cestode were found, *Monorygma grimaldii* from the abdominal peritoneum and testes, and *Phyllobothrium* sp. from the abdominal blubber.

A large amount of partly digested fish, *Merlangius merlangus* (Whiting) and *Gadus morhua* (Cod), as well as benthic crustacean remains in the forestomach suggested that feeding had taken place not long before death.

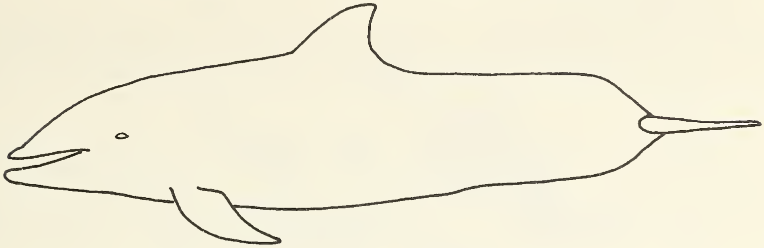
The respiratory system was found to contain a quantity of fine wet sediment which had been drawn deep into both lungs blocking many of the bronchi. The nasal sacs were filled with similar material which was indistinguishable from the mud present in the vicinity of the stranding area. It was evident that sea water had entered the lungs. There were no gross indications that this animal had been in poor health.

Discussion

1. *Body pigmentation*

The significance of body pigmentation patterns in delphinids has been the subject of much recent discussion (see Mitchell, 1970). Intraspecific colour variations between individuals, colour changes with age and the presence of localised markings within the general body

A



B

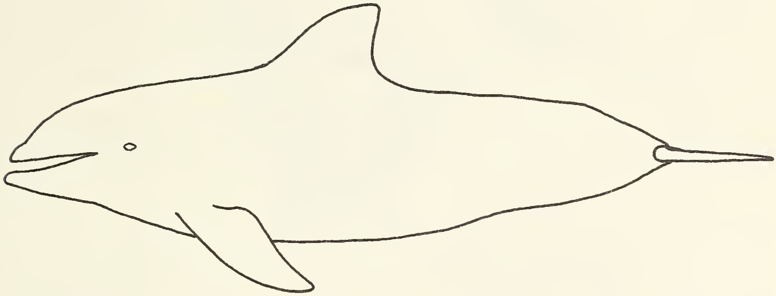


Fig. 2. Comparative body form in *L. acutus* (A) and *L. albirostris* (B) (263 cm ♀, North Sea).

pattern provide further difficulties in the interpretation of the adaptive values of skin pigmentation in dolphins.

Localised markings are an important feature of the body pigmentation of *L. acutus*, the white eye 'patch' and double flank stripe being of particular prominence. However, in considering the functional significance of these areas, the spectral absorption characteristics of sea water need to be taken into account. The upper buff coloured streak of the flank stripe would remain visible only at shallow depths due to the progressive loss of colour contrast with depth against the dorsal pigment. The lower whitish stripe, would, on the other hand, remain visible to greater depths due to its non-chromatic contrast against the dorsal pigment and might therefore function as a recognition marking during schooling or feeding to other dolphins.

The white eye 'patches' would similarly retain their definition with depth. When the dolphin is viewed head on, the eye 'patches' appear strongly contrasted and lie directly rostral to the eyes. The black eye ring and stripe are less well contrasted and appear to conceal the position of the eyes; when viewed laterally they appear to reinforce the eye position however.

The eye of *L. acutus* has a strongly reflective tapetum lucidum lying behind the retina and in well lit surface waters, light may be reflected out of the eye by the tapetum, giving rise to eyeshine. This eyeshine is potentially disadvantageous since it could be readily visible to prey at close range, particularly during feeding approaches where effective camouflage is necessary. The eye ring and eye 'patch' may therefore have the combined effect of enhancing the effectiveness of the countershaded head region by helping to mask eyeshine and appearing to visually confuse the exact position of the eyes to the prey.

2. *Post-mortem results*

There was no gross indication from the results reported here that this dolphin had been diseased in any way. The dolphin would appear to have died due to asphyxia upon inhalation of sea water and sediment in shallow water close to the stranding point. Since it had been feeding before death there is no indication that its sensory systems were not functioning normally.

It is therefore problematical to explain how and why asphyxia should have taken place. The dolphin may have become trapped in shallow water by the tide during feeding, but this in itself is unlikely to have been sufficient cause for its death. It is noteworthy that twenty-four hours after this stranding, a common porpoise *(Phocoena phocoena)* stranded alive on the same beach and after a period lying on the shore, swam away on the following high tide.

Conclusions

Certain areas of body pigmentation in *L. acutus* probably play important roles in visual recognition and predation. The possible development of eye markings specifically associated with the tapetalised eye in *L. acutus* suggests that similar types of markings may be present in other delphinids, particularly the fast swimming ichthyophagous species hunting in the epipelagic zone.

A consideration of the distribution of *L. acutus* based on the majority of previous strandings in British waters, would indicate that this animal was far south of its normal range. No evidence was found to link this stranding with parasitisation or disease.

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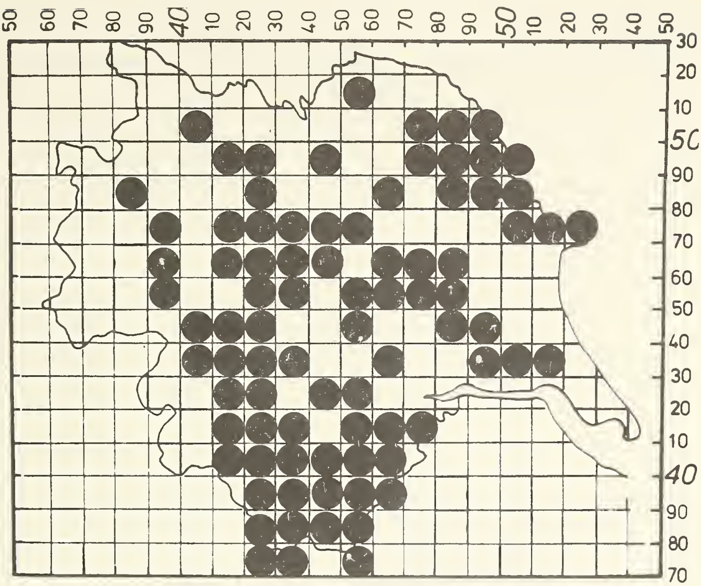
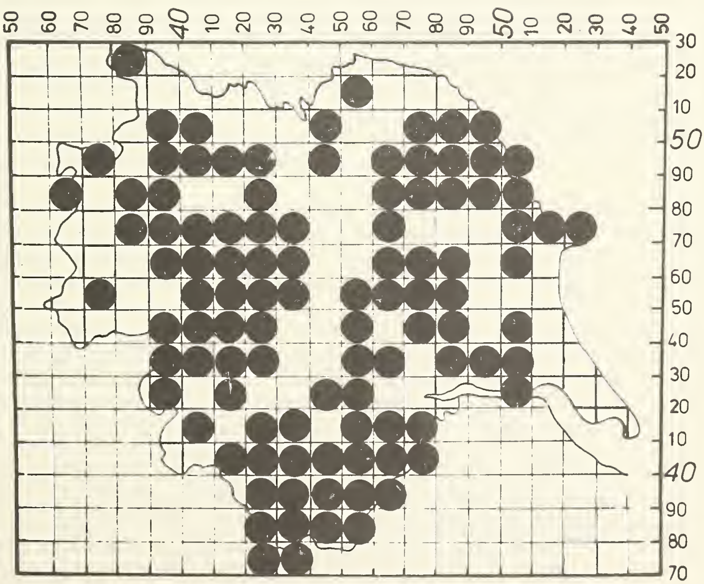
AMPHIBIAN AND REPTILE REPORT FOR 1976/1977

M. J. A. THOMPSON

The total number of records from the whole of Yorkshire, except for Sheffield, are greatly reduced from the previous two years; for 1976 the total numbers received were 113 and for 1977 were 74. These figures compare with 262 for 1975 and 222 for 1974. These low numbers may be a reflection of a general falling off of interest in recording amphibia and reptiles, but also, in the drought conditions of 1976, there were fewer amphibians seen. Nevertheless, during these past two years some useful gaps in the overall distribution maps for the county have been filled. For instance, the ten-kilometre distribution maps for the common frog *(Rana temporaria)* and the common toad *(Bufo bufo)* for Yorkshire, for the years 1970 to 1977, show that these two species are widely distributed throughout the county, except for some upland areas for the toad and from the Holderness area for both species (see maps 1 and 2).



Map 1. *Bufo bufo* from 1970–77.



Map 2. *Rana temporaria* from 1970–77.

The outstanding publication to come out in 1977 was the 'Amphibian Fauna of Sheffield' by Derek Whitely of the City Museum, Sheffield and printed in the Sorby Records No. 15. After appealing to the general public for records, especially in the 'Spot the Frog' project, Derek Whitely and his co-workers accumulated an extraordinary amount of information on this group in a highly urbanised part of England. As in previous reports, the Sheffield records have not been incorporated in the overall figures for 1976 and 1977. However 203 common frog records for the two years were received from Sheffield, along with 91 for the common toad, 6 for the smooth newt, 1 for the great crested newt and 8 for the palmate newt. The reptile records were 15 for the common lizard, 10 for the grass snake and 1 each for the adder and the slow worm. These records have added another five new ten-kilometre squares to the Yorkshire recording scheme.

Species	Individual Totals		10-km grid squares		New grid square	
	1976	1977	1976	1977	1976	1977
Triturus vulgaris	7	13 (26)	6	11 (19)	1	7 (8)
T. cristatus	9	10 (13)	6	9 (11)	2	4 (6)
T. helvetica	3	1 (15)	3	1 (13)	2	0 (6)
Rana temporaria	30	23 (95)	20	19 (45)	2	5 (11)
Bufo bufo	21	16 (56)	14	15 (32)	5	3 (11)
Lacerta vivipara	14	2 (22)	11	2 (16)	2	0 (3)
Anguis fragilis	4	0 (9)	3	0 (7)	1	0 (5)
Vipera berus	7	2 (14)	7	2 (9)	2	0 (3)
Natrix natrix	18	7 (14)	8	5 (7)	1	1 (1)

The figures in parentheses are for 1975.

The table shows an increase in the number of grass snake records for 1976, the year of the drought, especially from the Sheffield area and the Doncaster area. There seem to be fewer and fewer slow worm records. The Sheffield records, along with those for the rest of Yorkshire, have been sent to the Monkswood Biological Records Centre. The only alien species reported have been a dice water snake *(N. tesselata)* from Gilberdyke 44/82 (C.S.) and the midwife toad *(Al. obsteticoans)* in Yorkshire, established in 1933, continues to flourish (M.J.A.T.). Dice water snakes were previously recorded in the county at Holme-on-Spalding Moor in 1971 and at Scarborough in 1973 (see Y.N.U. Annual Reports for 1971 and 1973).

The new ten-kilometre squares for 1976 and 1977 records are listed as follows:

(1) **Smooth Newt** *(Triturus vulgaris)* for 1976 Cragg Pond, Farndale 44/69 (M.J.A.T.) and for 1977 Clark's Hall, Wakefield — numerous in ditches 44/32 (T.M.C.); Gamblethorpe, Temple Newsam 44/31 (C.A.H.); Oulston 44/57, Bishop Wilton 44/75 and Pickering 44/78 (M.J.A.T.) and Hutton Ambo 44/76 (T.P.)

(2) **Great Crested Newt** *(T. cristatus)* for 1976 Biller Howe Dale 45/90 (Scarborough N.H.S.); Dunnington 44/65 (P.P.); of interest — the Skelton breeding pond dried-up and no tadpoles were found 44/55 (M.J.A.T.). For 1977 Hayland Common, near Barnsley — now infilled — 44/20 (T.M.C.); Fellkirk — breeding pond — 44/31 (C.A.H.); Burstwick — old site in Holderness now infilled — 54/22; Pickering — three in a domestic pond — 44/78 (M.J.A.T.) and Frencheville 43/38 (M.H. from Sheffield Report).

(3) **Palmate Newt** *(T. helvatica)* for 1976 Haggwood Marsh, Y.N.T. Reserve 44/88 (M.J.A.T.) and Gouthwaite Reservoir 44/17 (Harrogate N.H.S.); for 1977 none.

(4) **Common Frog** *(Rana temporaria)* for 1976 Houghton Wold 44/83 (E.H.W.) and Lumley Moor Reservoir 44/27 (Harrogate N.H.S.). For 1977 Brandsby 44/67 (I.R.K.); Brackenthwaite Lane, Harrogate 44/25 (Harrogate N.H.S.); Ulleskelf Mires 44/53 (S.W.); Riccall Common 44/63 (D.F.); Harlow Carr Gardens, Harrogate 44/25 and Bishop Wilton — breeding in good numbers — 44/75 (M.J.A.T.).

(5) Common Toad *(Bufo bufo)* for 1976 Fimbar 44/86 and Skipwith Common Y.N.T. Reserve 44/63 (E.H.W.); Bank Newton 34/95 and Blubberhouses 44/15 (D.T.R.) and Nosterfield 44/28 (Harrogate N.H.S.). Of interest — Throxenby Mere 54/08 — road deaths total for 1976 were 923, making an overall total of 2543 in three years. For 1977 Temple Newsam 44/33 (C.A.H.); Bishop Wilton — several hundred in amplexus — 44/75 (M.J.A.T.); Pond Head Wood 44/75 (W.K.S.) and Brockholes 44/11 (D.W. from Sheffield Report).

(6) Common Lizard *(Lacerta vivipara)* for 1976 Skipwith Common 44/63 (E.H.W.) and Fairburn Ings R.S.P.B. Reserve 44/42 (S.M.). For 1977 Rockley Old Hall 44/30 (A.G.B. from Sheffield Report).

(7) Slow Worm *(Anguis fragilis)* for 1976 Blubberhouses 44/15 (D.T.R.), for 1977 none.

(8) Adder *(Vipera berus)* for 1976 Scar House 44/07 (Harrogate N.H.S.); Allerthorpe Common Y.N.T. Reserve 44/74 (E.H.W.) and Oakes Park on the Yorkshire/Derbyshire borders 43/38 (D.C. from Sheffield Report). For 1977 none.

(9) Grass Snake *(Natrix natrix)* for 1976 Bootham School grounds 44/55 (M.J.A.T.); for 1977 Kelsey Hill — in old gravel pit — 54/22 (P.O.) and Worsborough Reservoir 44/30 (A.G.B. from Sheffield Report).

Records received from W. Ashby, T. M. Clegg, W. A. Ely, I. Everett, D. Frost, C. A. Howes and the Doncaster Museum, Harrogate Natural History Society, J. Jarvis I. R. Kibble, S. Madge, T. Parr, Miss P. Pyrah, C. I. Massey and the Scarborough Natural History Society, P. Oldfield, W. K. Sessions, C. Simms, D. T. Richardson, Miss Jeanette Lambert, S. Warburton, E. H. Wear, C. H. Wear, Derek Whitely, D. Claves, M. Haythorne, A. G. Blunt, and numerous others who helped to compile the Sheffield Report, as well as my own records.

BOTANICAL REPORT FOR 1977

The recorders wish to thank all those who have contributed to this report. Unless otherwise stated the species included are those which are new to the 10 km grid square and are recorded in the *Atlas of the British Flora* for fewer than ten 10 km squares of the vice-county.

The figures indicate 10 km squares. †new county record. *new vice-county record.

In each vice-county list, names of contributors are given the first time each occurs and thereafter initials are mainly used.

EAST YORKSHIRE (V.C. 61) (E. Crackles)

Comparatively few records have been received during 1977, but these include outstanding ones, both for native and alien species.

The discovery that *Actaea spicata* occurs near Bishop Burton constitutes an interesting extension of the known distribution of this species. The occurrence of *Zostera angustifolia* at Spurn, found there by Mr Pashby, is a new county record. Mr Chicken has continued to collect *Taraxaca*; amongst these are *T. interveniens* and *T. bockmannii*, which are second and third British records respectively, as well as three other new vice-county records.

Actaea spicata L. Near Bishop Burton 44/94; Miss P. Gardam.
Clematis vitalba L. Disused railway, Hull; Mrs Colley, comm. E. Crackles.
Ranunculus lingua L. Bishop Burton 44/93; J. Atkin.
Papaver lecoqii Lamotte Octon Grange 54/07; E. Chicken. Near Warter; E. Wear.
Malva neglecta Wallr. Near Burton Fleming 54/07; E.Ch.
Vicia tetrasperma (L.) Schreb. Gypsy race bank, near Foxholes 54/07; E.Ch.
V. lathyroides L. Barmby Moor 44/75; Leeds Nats Club.
Saxifraga tridactylites L. In quantity, Kiplingcotes quarry and railway line 44/94; H. Peacock, comm. E. Crackles.
Epilobium roseum Schreb. Near Burton Fleming 54/07; E. Crackles.

The following *Taraxaca* determined by Dr Richards:

†*Taraxacum bockmannii* Hg. Speeton Hills, 1976, 54/17; E.Ch.

†*T. interveniens* Dahlst. Burton Fleming, 1976, 54/07; E.Ch.

**T. praestans* Lb. f. Melbourne, 1976, 44/74; E.Ch.

**T. rubicundum* (Dahlst.) Dahlst. Fordon, 1976, 54/07; E.Ch.

**T. spilophyllum* Dahlst. Scampston, 1976, 44/87; E.Ch.

†*Zostera angustifolia* (Hornem.) Reichb. Spurn, 1976, 54/41; B. Pashby.

Polygonatum multiflorum (L.) All. Near Bishop Burton, 44/94; E.W.

Dactylorhiza fuchsii (Druce) Soó × *D. purpurella* (T. & T. A. Stephenson) Soó Speeton, 54/17; D. J. Tennant.

Scirpus tabernaemontani C. C. Gmel. North Newbald, 44/93; D. R. Grant.

NORTH-EAST YORKSHIRE (V.C. 62) (T. F. Medd)

Equisetum hyemale L. Mallyan Spout 45/80; British Pteridological Soc. Meeting 1976.

Dryopteris pseudomas (Wollaston) Holub & Pouzar Raincliffe Wood, etc. 44/98 and Broxa, etc. 44/99; B.P.S. Meeting 1976. Bilsdale 45/50; Y.N.U. Excn.

D. pseudomas × *filix-mas* = *D.* × *tavelii* Rothm. with the above 44/98 and 44/99; B.P.S. Meeting 1976.

D. aemula (Ait.) Kuntze Hayburn Wyke 54/09; B.P.S. Meeting 1976.

Polystichum setiferum (Forsk.) Waynar Hackness 44/99 and Hayburn Wyke 54/09; B.P.S. Meeting 1976.

Diplotaxis tenuifolia (L.) DC. Waste-ground; York 44/65; Mrs W. M. Medd.

Hypericum elodes L. Ditch, Strensall Common; York and D.F. Nats.

Medicago falcata L. Grosmont 45/80; B. T. Fewster, 1976.

Vicia tetrasperma (L.) Schreb. Kirkham Abbey 44/76; York and D.F. Nats.

V. sylvatica L. Kirkham Abbey 44/76; York and D.F. Nats.

Potentilla anglica × *reptans* = *P.* × *mixta* Nolte ex Reichb. Sandburn Wood, Malton Road 44/65; W.F.S. Excursion.

Epilobium obscurum × *roseum* = *E.* × *brachiatum* Čelak. Robin Hood's Bay 45/90; E. Chicken det. T. D. Pennington.

Callitriche obtusangula Le Gall R. Derwent, Kirkham Abbey 44/76; York and D.F. Nats.

Symphytum tuberosum L. Red Scar Lane, Scalby 54/08; W.F.S. Excursion.

Galium uliginosum L. Marshy field, Coulton 44/67; T. F. Medd.

Crepis paludosa (L.) Moench With the above 44/67; T.F.M.

Potamogeton polygonifolius Pourr. Strensall Common 44/66; T.F.M.

Carex digitata L. Forge Valley 44/98; W.F.S. Excursion det. R. W. David

C. lepidocarpa Tausch. Marshy field, Coulton 44/67; T.F.M.

C. paniculata L. With the above 44/67; T.F.M.

Calamagrostis epigejos (L.) Roth World's End, Strensall Common 44/65; D. R. Grant

SOUTH-WEST YORKSHIRE (V.C. 63) (D. R. Grant)

As well as species new to the 10 × 10 km square, further species are included for their relevance in the compilation of the check-list of species recorded in V.C. 63 from 1970 onwards.

Osmunda regalis L. Railway cutting, Chevet, Wakefield 44/31; J. Watson; Luddenden, Halifax 44/02; F. Murgatroyd.

Phyllitis scolopendrium (L.) Newm. Shackleton, Halifax 34/92; F.M.

Dryopteris borreri Newm. Fox Clough, Langsett 44/10; Y.N.U. Excn.

Corydalis claviculata (L.) DC. Emley 44/21; N. Gill.

Rorippa sylvestris (L.) Bess. River Aire, Gargrave 34/95; T. Schofield.

Acer campestre L. Knott Wood, Todmorden 34/92; F.M.

Euonymus europaeus L. Stainton 44/59; E. Thompson.

Ulex gallii Planch. Heath, Wakefield 44/31; T.S.

Sorbus torminalis (L.) Crantz Old Spring Wood, Thorpe Salvin 43/58; C. B. Waite.

Epilobium anagallidifolium Lam. Hallam Moors 43/28; C.B.W.

Oenanthe aquatica (L.) Poir. Hensall 44/62; D.R.G.
Foeniculum vulgare Mill. Old railway, Old Snydale 44/42; D.R.G.
Bryonia dioica Jacq. Roadside, Ackworth Moor Top 44/41; E.T.
Rumex longifolius DC. Sentry Edge, Warley, Halifax 44/02; F.M.
Littorella uniflora L. Quarry Pool, Langsett 44/20; Dr L. Lloyd-Evans.
Anagallis tenella (L.) L. Corker Walls, Ughill 43/28; T.S.
Dipsacus fullonum L. Crigglestone, Wakefield 44/31; D.R.G.
Hieraciun diaphanum Fr. det. C. E. A. Andrews Bell Hill, Rothwell 44/32; D.R.G.
Elodea nuttallii (Planch.) St. John Fishlake 44/61; Y.N.U. Excn.
Potamogeton epihydrus Raf. River Calder, Sowerby Bridge 44/06; F.M.
Allium oleraceum L. Clifton, Rotherham 44/59; E.T.
Juncus subnodulosus Schrank East Marton 34/95; T.S.
Epipactis palustris (L.) Crantz Corker Walls, Ughill 43/28; D.R.G.
Eriophorum latifolium Hoppe Corker Walls, Ughill 43/28; C.B.W.
Eleocharis uniglumis (Link) Schultz. Near Langsett 44/20; Ll.E.
Carex pendula Huds. Deepcar, near Sheffield 43/29; C.B.W.
C. laevigata Sm. Fox Clough, Langsett 44/10; Y.N.U. Excn.

MID-WEST YORKSHIRE (V.C. 64) (J. R. Hickson)

New records for species previously recorded in fewer than ten 10 km squares since 1950 or in less than five 10 km squares in either western or eastern sides of the V.C. are listed below:
Coronopus squamatus (Forsk.) Aschers. Bond Ings, Sherburn-in-Elmet 44/53; Y.N.U. Bot. Sec. Excursion.
Polygala amara L. Fountains Fell 34/87; D. J. Tennant, 1975.
Hypericum montanum L. Small colony on grassy bank, Ingleton 34/67; railway bank, Settle 34/86; F. J. Roberts.
Vicia tetrasperma (L.) Schreb. Disused railway embankment, Newland 44/62; Y.N.U. Excursion.
Rubus spp. determined by A. Newton:
R. scissus W. R. C. Wats. Weston, near Otley 44/14; Mrs F. Houseman.
R. eboracensis W. C. R. Wats. Ellar Ghyll, Otley 44/14; F. Ho.
Agrimonia procera Wallr. Side of path, Lindley Wood 44/14; roadside verge, Camblesforth 44/62; J. R. Hickson.
Circaea intermedia Ehrh. By R. Wenning, Clapham Station 34/76; F.J.R.
Oenanthe fistulosa L. Along field ditch, Horton in Craven 34/85; J.R.H.
Rumex longifolius DC. Roadside near Thruscross 44/15; D. R. Grant.
Urtica urens L. Small colony on dumped peaty compost, Newby Moor 34/76; F.J.R.
Hottonia palustris L. The Carr, Marton 44/46; Mrs D. E. Haythornthwaite and Miss M. R. Sanderson.
Gentianella campestris (L.) Börner Newby Moor 34/76; B. & J. Burrow per F.J.R.
Limosella aquatica L. Beaver Dyke Reservoir, Haverah Park 44/25; Swarthmore Botany Club, per J.R.H.
Zannichellia palustris L. Bond Ings, Sherburn-in-Elmet 44/53; Y.N.U. Bot. Sec. Excursion.
Juncus gerardii Lois. On clay in gravel pits, Ben Rhydding 44/14; F.J.R.
Epipactis palustris (L.) Crantz Pan Beck, Hellifield 34/85; J.R.H.
Ophrys apifera Huds. Disused railway embankment, Drax 44/62; Y.N.U. Excursion.
Dactylorhiza fuchsii (Druce) Soó × *D. traunsteineri* (Sauter) Soó Upper Wharfedale 34/96; D.J.T., 1975, det. R. H. Roberts.
D. traunsteineri (Sauter) Soó Two sites in Upper Wharfedale 34/96; D.J.T., 1975 and 1977, det. R.H.R.
Eleocharis uniglumis (link) Schult. Austwick Moss 34/76; Mrs E. Shorrock, per F.J.R.
Carex elata All. The Carr, Marton 44/46; D.E.H. & M.R.S.
Apera spica-venti (L.) Beauv. Near Henwick Hall railway crossing, Burn 44/62; D.R.G.

NORTH-WEST YORKSHIRE (V.C. 65) (T. F. Medd)

Hypericum maculatum × *perforatum* = *H.* × *desetangsii* Lamotte Great Langton 44/29; J. Gilleghan per Mrs F. Houseman.
Meum athamanticum Jacq. Old racecourse, Richmond 45/10; Mrs K. Horn.
Symphytum tuberosum L. Hartforth Hall 45/10; Y.N.U. Excursion.
Melampyrum sylvaticum L. Upper Teesdale; D. J. Tennant. det. A. J. E. Smith.
Valerianella carinata Lois. Garden weed, Constable Burton Hall 44/19; T. F. Medd.
V. locusta (L.) Betcke Garden weed, Hartforth Hall 45/10; Y.N.U. Excursion.
Gagea lutea (L.) Ker-Gawl. Kilgram Bridge 44/18; Mrs F. Houseman.
Listera cordata (L.) R. Br. Oxnop Gill 34/99; R. Smith.
Carex digitata L. Tanfield 44/27; R. W. David.

CASUALS and ADVENTIVES (Mrs F. Houseman)

Vice-county numbers are shown in parentheses.

Papaver somniferum L. (65) Abundant, gravel pits, Great Langton-on-Swale 44/29; F. Houseman; (64) Tholthorpe dump 44/46.
Sisymbrium orientale L. (62) Strensall Common Y.N.T. Reserve 44/66; T. F. Medd; (64) Waste land, Eldon Walk, Leeds 44/23; F.H.; (64) Bradford Road, Otley 44/14; F.H.; (61) Keldgate, Beverley 54/03; J. Atkins.
S. altissimum L. (61) Keldgate, Beverley 54/03; J.A.
Vaccaria pyramidata Medic. (61) High Street, Hull 54/12; Miss E. Wear; (64) Tholthorpe 44/46; R. B. Houseman.
Corrigiola littoralis L. (61) Priory railway sidings, Hull 54/02; H. Peacock, per Miss E. Crackles.
Montia perfoliata (Willd.) Howell (61) Near Hempholme 54/04; A. Marshall comm. E.C.; (61) Wheldrake 44/64; Miss J. Lambert; Marston Moor, Obelisk 44/45; T.F.M.
M. sibirica (L.) Howell (64) In ditch, Askwith Moor Road, near Otley 44/14; F.H.
Portulaca oleracea L. (61) Greenhouse weed 54/05; E. Chicken.
Melilotus officinalis (L.) Pall. and *M. alba* Medic. (65) Both in fair quantity, gravel pits, Great Langton-on-Swale 44/29; F. H.
Trifolium subterraneum L. (61) Barmby Moor 44/75; Leeds Naturalists.
T. resupinatum L. var *suaveolens* det. E. Clements (63) Waste ground, Dewsbury 44/22; R.B.H.
Scorpiurus muricatus L. (63) Garden weed, Pudsey 44/23; Mrs E. Boyes, per Miss M. Hartley.
Rosa willmottiae Thunb. det. R. Melville (64) Railway embankment, Ellar Ghyll, Menston 44/14; F.H.
Prunus cerasifera Ehrh. (64) Marston Moor, Obelisk 44/45; T.F.M.
Oenothera multiflora Gates. det. Dr Rotanske (Poland) (63) Collected at Baildon 44/13 in 1962 by the late J. E. Lousley in my presence; F.H.
Humulus lupulus L. (64) Roadside, North Stainley 44/36; J. Oxtoby.
Cannabis sativa L. (61) High Street, Hull 54/12; E.W.
Symphytum orientale L. (61) Welton 44/92; F. B. Stubbs.
Pentaglottis sempervirens (L.) Tausch (65) Gravel pits, Great Langton-on-Swale 44/29; R.B.H.
Calystegia sepium (L.) Br. subsp. *pulchra* (Brummitt & Heywood) (61) Garden weed, Beverley Westwood Hospital 54/05; E.C.
Linaria purpurea (L.) Mill. (64) Roadside, North Stainley 44/36; R.B.H.
L. repens (L.) Mill. (61) Priory sidings, Hull 54/02; E.C.
L. repens × *vulgaris* = *L.* × *sepium* Allman with above; E.C.
Scrophularia vernalis L. (62) Garden weed, Bootham Crescent, York 44/55; T.F.M.
Nepeta × *faassenii* (Garden Catmint) (64) Roadside, Plumpton Bar, near Knaresborough 44/35; Mrs N. Eastwood.
Campanula rapunculoides L. (62) Strensall station 44/66; T.F.M.

Asperula arvensis L. (61) High Street, Hull 54/12; E.W.

Centranthus ruber (L.) DC. (64) Roadside, North Stainley 44/36; R.B.H.

Solidago gigantea Ait. (64) Edge of woodland, Winksley 44/27; R.B.H.; roadside, Pot Bank, Beckwithshaw 44/25; J.O.

Centaurea salmantica (L.) *Mantasalca salmantica* det. R. D. Meikle. (61) High Street, Hull 54/12; E.C.

Hieracium brunneocroceum Pugsl. (61) Priory sidings, Hull 54/02; E.C.

Helianthus annuus L. (64) Tholthorpe dump 44/46; J.O.

Carthamus lanatus L. (64) Tholthorpe dump, two plants 44/46; F.H.

Cicerbita macrophylla (Willd.) Wallr. (64) Roadside, Killinghall 44/25; F.H.

Polygonatum multiflorum (L.) All. (65) In small wood by River Burn, Masham 44/28; F.H.

Juncus tenuis Willd. (64) Old railway track, Ellar Ghyll, Menston 44/14; F.H.

Briza maxima L. (64) Tholthorpe dump 44/46; R.B.H.

Hordeum jubatum L. (63) Roadside M1 Wakefield/Bradford/Leeds junction 44/32; Mrs D. E. Haythornthwaite.

Phalaris canariensis L. (64) Tholthorpe dump 44/46; J.O.

A REVIEW OF THE FOOD AND MORTALITY OF WATER VOLES IN YORKSHIRE

C. A. HOWES

Museum and Art Gallery, Doncaster

The water vole, *Arvicola terrestris* (L.), occurs in suitable aquatic and waterside habitats throughout Yorkshire from the upland streams of the Pennines and the North Yorkshire moors down to Holderness and the shorelines of the Tees and Humber. It is a familiar sight on the grossly polluted rivers and canals of industrial south and west Yorkshire, though its main strongholds are by the meandering river systems of the Vales of York and Pickering and in the fens, carrs and marshes of North Humberside and the Humberhead levels.

Little work has been published on the water vole in Yorkshire, the only significant contributions to date being Fred Dean's[2 and 3] studies of a population occupying the banks of a mill dam at Hebden Bridge. It is hoped that the following note may encourage further systematic studies. (Unless otherwise stated all records are the author's.)

Food

Studies in Czechoslovakia have recorded 31 species of foodplant and in Holland 28 species have been noted[13]. In Britain, Barrett-Hamilton[6] lists sixteen taxa and Southern[12] adds a further three.

Ryder[9] shows that her captive population fed on a wide variety of dicotyledonous and monocotyledonous plants including many garden plants and weeds. Dean[2 and 3] listed as food plants vetch *(Vicia* sp.*)*, red clover *(Trifolium pratense)*, great plantain *(Plantago major)*, ribwort plantain *(P. lanceolata)*, watercress *(Nasturtium officinale)*, hemlock *(Conium maculatum)*, shepherd's purse *(Capsella bursa-pastoris)* and the fallen leaves of sycamore *(Acer pseudoplatanus)*. He also observed that the seed heads of *Glyceria maxima* were collected for storage.

Recent observations have provided the following feeding records: *Agropyron repens* (Blacktoft Sands); *Calamagrostis canescens* (Thorne Moors); *Carex acutiformis* (Langold Lake); *C. demissa* (Thrybergh reservoir); *Eliocharis palustris* (Thrybergh reservoir); *Eriophoram vaginatum* (Thorne Moors); *Equisetum fluviatile* and *E. palustre* (Potteric Carr); *Glyceria fluitans* (River Went); *G. maxima* (Arksey Ings and Denaby Ings); *Juncus articulatus* (Thorne Moors); *J. effusus* (marshes, ponds, ditches and riversides throughout

lowland South Yorkshire); *J. inflexus* (River Went); *Phragmites communis* (Blacktoft Sands, Faxfleet and Potteric Carr); *Poa annua* (Langold Lake); *Salix atrocinerea* (Thorne Moors and Potteric Carr); *S. fragilis* (Denaby Ings and Arksey Ings); *S. viminalis* (Thorne Moors and Potteric Carr); *Sparganium ramosum* (Arksey Ings); *S. simplex* (River Went and Thrybergh reservoir) and *Triglochin palustris* (Thorne Moors).

Water voles were known to be "occasionally destructive" to *Salix* spp.[6]. Dean[2] noted animals taking shoots, leaves and catkins, one animal eating twelve catkins at one sitting. Bark stripping from fairly young growth of *S. atrocinerea* and *S. fragilis* has been noted at Thorne Moors, and at Denaby Ings, animals are often seen several feet up collapsed branches and trunks of old crack willows in search of tender shoots. During the drought year of 1976, exposed root systems of waterside willows were also eaten.

Sugar beet, mangolds and swedes are judged to be "rarely" eaten[6] and in hard weather potatoes, turnips and carrots are resorted to[10]. Sugar beet has been eaten near Swinefleet and mangolds near Howden, though the plants concerned had been discarded into field drains after harvesting.

Although much reported e.g.[8, 9 and 13], carnivorous and carrion eating behaviour is probably rare. Ryder[9] speculates that this behaviour could be to compensate for physiological deficiencies caused, for example, by repeated pregnancies.

Freshly broken shells of freshwater molluscs e.g. *Anodonta cygnea* L., *Lymnaea stagnalis* L. and *L. peregra* (Mull) are not infrequently found at water vole feeding platforms. This evidence however is circumstantial and to date there are no actual observations of feeding on mollusc flesh.

Table 1. % frequency of water voles as prey items in the diets of barn owls from 9 Yorkshire sites.

Locality and grid ref.	Period of collection	Total no. of pellets	Prey items	Water-voles	% prey items
Ackworth SE 4517	-/8/1975, -/11/1975 (a)	58	261	1	0.38
Adwick-le-Street SE 5408	8/12/1973	163	391	7	1.79
Armthorpe SE 6204	1972–1974	120	232	6	2.59
Barnby Dun SE 6109	1974–1977	230	809	17	2.10
Goldsbrough SE 3856	7/3/1975	42	144	3	2.08
Mexborough SE 4700	Summer 1976 (b)	49	180	3	1.66
Rawcliffe Bridge SE 7121	-/6/1977; -/7/1977	35	119	12	10.08
Swinefleet Common SE 7919	17/9/1977; 11/2/1978 (c)	215	564	51	9.04
Thorne Moors SE 7017	/10/1972	56	194	3	1.55

All pellets analysed by the author except (a) = N. V. Mendham, (b) = S. McGinn and (c) = S. Holliday.

Mortality

Of bird predators in Britain, Witherby *et al.*[14] record water voles having been taken by long-eared owl *(Asio otus)*, tawny owl *(Strix aluco)*, barn owl *(Tyto alba)*, kestrel *(Falco tinnunculus)*, golden eagle *(Aquila chrysaetos)*, hen harrier *(C. cyaneus)*, common buzzard *(Buteo buteo)*, marsh harrier *(Circus aeruginosus)*, red kite *(Milvus milvus)*, heron *(Ardea cinerea)*, bittern *(Botaurus stellaris)*, and raven *(Corvus corax)*. Records are available for the following species in Yorkshire:

HERON — Remains are frequently identified in pellets, e.g. at Scampston (C.I.M.), and at Hornsea Mere and Hatfield Moors (M.L.).

KESTREL — Water voles constituted 28.6% of the prey items (6 out of 21 prey items from 16 pellets) of a bird hunting over peat workings on Thorne Moors during December 1974.

SHORT-EARED OWL *(Asio flammeus)* — Although not listed by Witherby *et al.*[14] water vole represented 6.6% of prey items (1 out of 15 prey items) taken by a bird at Blacktoft Sands R.S.P.B. reserve during April 1973.

TAWNY OWL — Dean[3] gives circumstantial evidence but no actual proof was obtained.

BARN OWL — Studies of diets from 19 lowland Yorkshire roost sites have shown that water voles had been preyed upon at 9 (47.3%) of these sites (see table 1). From a total of 1,103 pellets, 3,551 prey items were identified in which 103 (2.9%) were water voles. Frequencies of water vole remains in pellet batches ranged from 0.38% of prey items at Ackworth — a relatively dry, undulating arable and suburban area with very few water-filled ditches — to 10% of prey items at Rawcliffe Bridge — a lowland arable district drained by a network of dykes and field drains and an area through which the tidal river Don and the South Yorkshire Navigation pass.

Since Yorkshire diets were sampled predominantly from areas with a potential for water vole presence, it is reasonable that the proportion of diets containing water vole remains and the % frequency of water voles in the diets should be higher than in the national survey,[5] where water voles were present in only 16% of diets sampled, and made up only 0.2% of prey items.

Of mammalian predators in Britain, otter *(Lutra lutra)*, pine marten *(Martes martes)*, polecat *(Mustela putorius)*, stoat *(M. erminea)*, weasel *(M. nivalis)*[10], mink *(M. vison)*[13], fox *(Vulpes vulpes)*, domestic cat *(Felis sylvestris)*[8] and brown rat *(Rattus norvegicus)*[10] are listed. Records are available for the following species in Yorkshire:

OTTER — In the Vale of York, Simms[11] found water vole remains in at least 22 (36.6%) of 60 spraints where they represented the third most important prey species. He also found remains on six of ten otter feeding 'tables' where they formed the most frequent prey species identified.

STOAT — Water voles taken at Ganton (C.I.M.) and Gowdall represent 4.7% of Yorkshire stoat prey records[7].

WEASEL — Batten[1] described the killing of two adult and several immature water voles on the bank of the river Wharfe at Bolton Abbey, and Dean[3] reported an immature animal being caught at Hebden Bridge. M. Limbert (pers. comm.) watched a weasel systematically examining water vole burrows along the bank of a drain on the edge of Thorne Moors.

FOX — A long term study of the food of foxes on Thorne Moors, an area of lowland raised peat bog, now extensively managed for mechanical peat-winning operations, has shown that water vole remains were present in 11.9% of the total diets (remains in 25 of 210 scats) and ranked with *Microtus agrestis* as joint third most frequent prey item. Remains were present in 1% of diets (1 in 102 scats) collected during November and December 1977 from around Hornsea Mere.

DOMESTIC CAT — Dean[3] noted that domestic cats "took a heavy toll" of the water vole population in his study area. Cats have also been reported catching water voles at Halifax (I.M.) and at Brompton (C.I.M.).

Of fish predators, there are British records of pike *(Esox lucius)*, large eels *(Anguilla anguilla)*, and large trout *(Salmo trutta)* taking water voles[6].

PIKE — Anglers in Yorkshire occasionally report instances where they assume pike have taken water vole; however the only actual evidence to hand is of a water vole being removed from the gut of a pike caught during the 1850s in the River Idle at Misson on the Yorkshire/Nottinghamshire border (Doncaster Museum records).

Of other causes of death, there is one Yorkshire road casualty record. Weekend-shooters, particularly around urban areas, no doubt account for considerable numbers, and animals are not infrequently caught by dogs and ferrets "ratting" along river and canal banks[3]. Water vole numbers were reported much depleted after the severe winter of 1962–3, e.g. at Wintersett and Worsbrough reservoirs (J.S.A.).

Habitat Changes

Fluctuations in water level which leave water vole burrow systems some distance from the water's edge evidently increase vulnerability to predators. These circumstances had

apparently led to the weasel kills cited earlier. It may be significant that in Sweden, where water voles tend to be rather more terrestrial than in Britain, Erlinge[4] found that they constituted 16% of weasel prey in a woodland area of Scania. Five animals were caught in mole traps a mile from a mill dam after it had been drained and its water vole population apparently dispersed[3].

Disturbance, involving the removal of waterside cover, evidently produces significant changes in predation levels. In the well vegetated "old canals" area of Thorne Moors where animals are frequently observed, water voles were only present in 8% (13 out of 161) of fox scats, whereas in areas stripped of vegetation in preparation for peat cutting, they occurred in 24.5% (12 out of 49) of fox scats. Interestingly, in barn owl pellets collected from the arable warpland area on the eastern side of Thorne Moors, drained by numerous dykes and ditches (often clinically maintained), water voles represented up to 13.2% of prey items (38 out of 287 prey items from 95 pellets) whereas in the well vegetated fenland and rough pasture area on the opposite (western) side of Thorne Moors, water voles, though apparently numerous, represented a mere 1.6% of barn owl prey items (3 out of 194 prey items from 56 pellets). A similar phenomenon was monitored at Armthorpe near Doncaster where coincidentally with a programme of re-digging ditches and drains around the colliery tip, the % frequency of water voles in the diets of barn owls hunting over the area rose from 3.1% (1 out of 60 prey items from 32 pellets) to 22.7% (5 out of 60 prey items from 22 pellets).

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POMPOCALI, A TOPOGRAPHIC CURIOSITY

A. HENDERSON

'. . . to airy nothing
A local habitation and a name.'
A Midsummer Night's Dream, v. i. 16–17

Any field-worker owes much to that mine of information, the map of his area. Ordnance Survey maps have been published since 1791; the increasingly high standards set from the mid-nineteenth century have made reliance on them second nature. Very occasionally, however, an entry is encountered that is problematic or even misleading. This paper is concerned with such an entry on the map of Yorkshire (e.g. 2½″ Sheet SE34, 1961), the impressive Roman-sounding name, Pompocali, and with the nature of the site to which it is assigned.

The Name and its Place on the Map

The distinctive earthworks of Pompocali (Fig. 1) are situated immediately east of Scarcroft Beck and south of the border of Hetchell Wood Nature Reserve coinciding with the Bardsey-Scarcroft parish boundary. Dixon (1855) described the physiognomy of the place thus: 'some considerable earthworks, occupying the summit of a steep, rocky bank, washed at the foot by a small stream, and on two sides nearly inaccessible. The chief feature is a large mound, partly surrounded by a deep trench.' The whole site covers a roughly pentagonal area of 17 000 m^2, 150 m in length and 150 m in width. Around a central mound, 70 m long, 20 m wide, stands a set of surrounding mounds and embankments. These banks and mounds, rising in places to a height of *c* 10 m, are in general steeply sloped, angled above the horizontal from *c* 25° to *c* 40°, narrowly terracetted by soil movement, rabbits, etc., and generously dotted with oak stumps. Bogg (1904), writing like Dixon at a time when the whole was wooded, expanded: 'To those standing on the natural rampart, it is easy to call up a picture of the ages when the Celt endured the yoke of the Roman, and later that of the Teuton at Rigton.'

Bodington (1895) was the first to give a reasoned dismissal of the name's assignment to this site, although Murray (1867) had previously stated: 'This very name, in the shape of Pampycallo, is *said* to have been retained to the present day; but it is questionable whether some ardent antiquary may not have succeeded in establishing it at a comparatively later period.' Bodington's opinion is confirmed by modern studies of two old manuscripts, the Ravenna Cosmography (Richmond and Crawford, 1949) and the Antonine Itinerary (Rivet, 1970). The name, Pompocali, in its early form, Pampocalia, is included in a list of British names in the former of these, a seventh-century compilation which the percipient antiquarian, John Horsley, summed up (1732) as 'a confused and disorderly collection of the names of places, put together by some ignorant monk, from a variety of writers of different ages, who he calls philosophers.' Among the sources for the Cosmography's British section, which shows no trace of post-Roman material, was the Antonine Itinerary. Richmond and Crawford (1949) proposed that the offending scribe, copying carelessly from the Itinerary, combined two Roman names, Cambodunum (= an as yet unfound Roman station near Dewsbury: Rivet, 1970) and Calcaria (= Tadcaster), producing the corrupt conflation, Pampocalia. This explanation convincingly solved the long-standing puzzle of the gap between Campoduno (= Cambodunum) and Mamucio (= Mamucium, Manchester) (marked by an obviously incorrect total for the distance between Calcaria and Mamucio) in Iter II of the Itinerary which here lists stations on the way from Eboracum (= York) to Mamucio.

Bodington, unlike Dixon, appears not to have known of John Warburton's map of Yorkshire (1720, see Fig. 2), the first map to give Pompocali a location, but points out that Dean Thomas Gale of York, having come by a copy of the 'anonymous Ravennas', had asked

Figure 1. Aerial photograph of Pompocali. Detail from HSL UK 73/43/no. 3354 Aerofilms Ltd.

the Leeds antiquarian, Ralph Thoresby, whether he could site the name. Gale's original query occurs in a letter (Stukeley, 1885) replying to Thoresby's of 26 June 1695. Interestingly, in view of Richmond and Crawford's explanation of the name's origin, Gale suggests on etymological grounds that the correct reading may be Campocalia (see also Horsley, 1732, p. 501).

Thoresby was still pondering the matter in 1719 when Warburton was carrying out his survey of the West Riding, during which time he was a frequent visitor at Thoresby's home. Thoresby's Diary (19 Oct. 1719) recounts: 'Upon Bramham Moor he [Warburton] conducted me to a certain place where three of their [the Romans] ways part, one over by St. Helen's ford to the north, another grand road through Tadcaster to York and a third towards Thorner. . . .' Warburton's Journal for 20 Feb. 1719 records his earlier discovery of this junction. The road here described as making 'towards Thorner' is an approximation of the one (no. 729 in Margary, 1973) which, further west *en route* to Ilkley, joined the more northerly east-west road passing through Warburton's Pampocalia. Ramm (1976), however, notes of this Ilkley-Tadcaster stretch that 'east of Brandon Lodge the road divided into two branches which both joined the Roman Ridge west of Tadcaster and are too close to be contemporary. The north branch probably is a reconstruction of the road on a course to avoid the steep-sided valleys encountered in the southern branch'. Ramm's route for the northern branch takes it through the cutting south of Pompocali and not along the previously accepted line (Margary, 1973) of the Hetchell Wood and parish boundary at the north of the site.

Evidently Warburton decided at some time in 1719 to attach the name, Pampocalia, to the (as he believed) important station at the intersection of this east-west road and the major north-south road he maps crossing it. This latter is, as Bodington argued, imaginary. Recent work (to be published in the forthcoming *Survey of the Archaeology of West Yorkshire to A.D. 1500*) shows that what Warburton no doubt took as one of the main indications for such a road, the north-south embankment along the eastern edge of Temple Newsam grounds (no. 728 in Margary, 1973), is in fact a defensive earthwork. A preliminary search through the Warburton papers in the British Museum (Lansdowne MSS.) to ascertain Warburton's knowledge of the local terrain more precisely, has proved unproductive. No survey sheet or sketch map was traced for the Leeds-Wetherby route shown by Warburton which leaves Leeds in an easterly direction and then bears north over Whinmoor to pass through Thorner to Pampocalia. The Leeds-Wetherby road for which a survey sheet was found, dated 'July ye 8th 1719' (Lansdowne MSS. 895, 913), is the more westerly route through Moortown, Wike and Keswick.

The standard of Warburton's cartography in his 1720 map has received belated recognition (Crump, 1926; Hayes and Rutter, 1964; Rawnsley, 1971). Plagiarist he was at times (Bruce, 1966), but his survey work for this map was often detailed and exploratory in practice as well as based on a carefully acquired knowledge of earlier work. His mapping of Roman roads, for instance, though subsidiary to his main purpose, is for all its errors greatly superior to that in the later unsigned map of Roman roads in the County of York (Drake, 1736) probably engraved by Isaac Basire (Gardiner, 1973).

Once Warburton's map showing 'Pampocalia' was issued, Overton and Bowles (1728) and Bowen (1750) were content to copy his coinage, although (Bodington, 1895) the name is not to be found on the more circumspect map of Jefferys (1772). It is also absent from Teal's excellent 'Plan of the Scarcroft Estate' (1790, see Fig. 4). The name's absorption into local usage is, however, evidenced by Nettleton (1893): 'The place is commonly called Pampocalia, and it appears to have been known by that name for a long time. In 1858 I was told by Mrs Daniel who was at that time about ninety years of age, that when she was a young girl it was always called by the name of Pampocalia.'

Such local acceptance of the name is not surprising. Warburton's map was in the homes of many of Yorkshire's landed gentry who, in addition to the subscription fee of £1 2s 6d, had paid sums varying from 10s to £1 2s 6d for their arms to be displayed upon it (Lansdowne MS. 916). The dependence of the Ordnance Survey's mappers on the opinions of local personages and antiquarian interests (Harley, 1971) was a virtual guarantee of the name's

Fig. 2. Detail (× 2) from Warburton's map of Yorkshire, 1720.

inclusion on the first O.S. maps of the region, the 1849 6″ sheet and the 1′ full and quarter sheets reduced from it during the 1850s (which casts an ironic sidelight on Harley's comment that just as the O.S. 'had rescued names from oblivion, so, too, it helped to ensure that they remained on the map'). Pampocalia was also accepted by Charles Newton of the Department of Antiquities, British Museum, for the map of British and Roman Yorkshire prepared for the Archaeological Institute's York Meeting in 1846. Thus the name's insertion achieved the respectability later deplored by Bodington, and speculation was encouraged as to the site's origin.

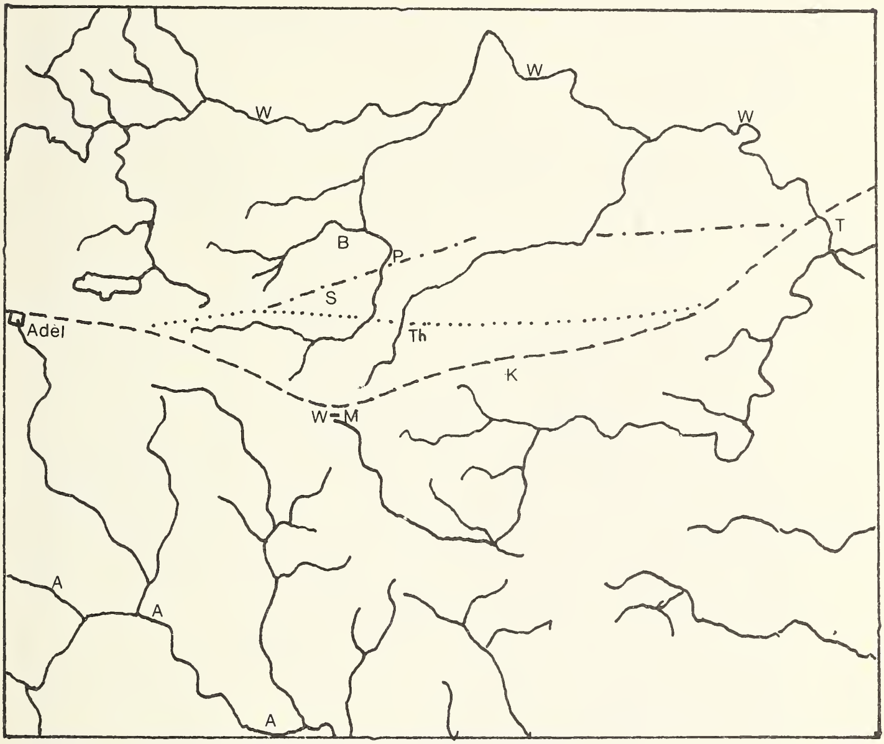


Fig. 3. Sketch-map of prehistoric and Roman routes from Adel to Tadcaster.
— — — = prehistoric route (Kitson, Clark 1911)
. . . . = Roman road (Clark 1911)
— · — · — = later Roman road by Pompocali (Ramm 1976)
A = River Aire
B = Bardsey
K = Kiddal
P = Pompocali
S = Scarcroft
T = Tadcaster
Th = Thorner
W = River Wharfe
W–M = Whinmoor

History and Ecology of the Site

From the time of Warburton's establishment of Pampocalia, a favourite suggestion (e.g. Dixon, 1855) has been that it is the remains of a British, Danish or Roman fort or station. Bogg (1904), like others, found inspiration in the various archaeological finds from the neighbourhood.

The importance during the Bronze Age and Roman times of the watershed between Wharfe and Aire was recognised by Clark (1911) and Elgee (1933). Both map a cross-country trade route (see Cowling (1946) for its beginnings in the Mesolithic period) running from the mouth of the Ribble in the west to Yorkshire's east coast, used by the Irish and Danes and supported by numerous finds. This route passed through the Aire Gap (see Fig. 3), proceeding via Ilkley and Adel to Kiddal and Tadcaster (Cowling (1946) provides a later study of the Addingham-Otley stretch), then on over the Wolds towards Bridlington and Filey. Wherever possible, the route kept to higher, less forested and less vulnerable terrain. (Clark (1911) notes, as a modern confirmation of the semi-sandy nature of the route's preferred ground, the presence on the Adel-Tadcaster stretch of three golf-courses.) Details are admittedly conjectural, but it appears to have come via Alwoodley where it turned in a south-easterly direction to head over Whinmoor, 3 or 4 km south of Pompocali, and then veered north-east toward Kiddal. The Romans, on adopting the route, first took a more northerly short cut from Alwoodley to Bramham, i.e. the southern branch (no. 729 in Margary, 1973) of the Ilkley-Tadcaster road described above, and then at a later date the even more direct route of Ramm's road (a probable 'reconstruction', see above), cutting along the southern edge of Pompocali. The laying of this road can be seen as the developmental 'coming of age' of the site's immediate area. Despite this adjacency of road and site, no casual finds from the site proper (although the lack of any archaeological dig should be borne in mind) lend credence to its having been a fort or station (e.g. Dixon, 1855; Bogg, 1904) and none of the various finds in nearby localities (see e.g. Wright, 1965; Ramm, 1965; West Yorkshire County Archaeology Unit to date) justifies such claims. Nor do the natural features of the region tend to such a conclusion. Although with an impressive vantage over land to the west, the site is eminently open to attack from the ample high ground to its east. The earthworks themselves bear no resemblance in plan or visible formation to a Roman fort or station. A more tenable suggestion might be of occupation over some period of peaceful settlement. The propinquity of streams and springs, the nature of the soil and the known track-pattern of the area are persuasive points, but such a hypothesis can only be peripheral to an explanation of the main features of the site today.

Another explanation of the site has been prompted by the name it bears on two detailed local maps, Teal's Plan of the Scarcroft Estate (1790, see Fig. 4) and Porter's map of the Yorkshire Estates of George Lane Fox (1814–18). The name, Pompocali, is absent from both. On the former the site is named Coney Garth Spring, on the latter Coney Garth Spring Wood. Both maps represent the site pictorially as treed, and in the Valuation accompanying the former, the entry under the heading Cultivation is Wood. Spring is an ambiguous term denoting probably recently spontaneously grown/planted woodland and/or the neighbouring springs. As the woodland was of oak, the trees, whose stumps today litter the site, were probably planted, although there are a few very young, intrusive self-sown oaks on the present-day site (see Fig. 5). Coney Garth derives (Smith, 1961–63) from the Middle English coning-erthe (= rabbit warren) and is associated with enclosures colonised by rabbits owing either to their introduction by man or their self-establishment and encouragement.

Rabbits were first brought into this country shortly after the Norman Conquest (Hurrell, 1971–72) and their eventual spread followed on their gradual introduction into managed warrens whence they subsequently escaped into the wild. No feature at Pompocali, however, is at all reminiscent of the warrens known in many parts of the country, e.g. North Yorkshire (Hayes and Rutter, 1974; Rutter, 1961), East Yorkshire (Harris, 1971) and Dartmoor (Linehan, 1966), with their various structures such as pillow mounds, linear embankments, etc., aimed at the encouragement/management of colonies (see also Harting, 1898). Admittedly the steep banks and light soil of the site make Pompocali a habitat predisposed to invasion and colonisation by rabbits, but the height and contours of the banks and their

Fig. 4. Detail from Teal's plan of Scarcroft Estate, 1790, showing Coney Garth Spring.

layout in no way suggest an eye to the needs and conveniences of warren management. The 'most upstanding' mounds Linehan reports on Dartmoor are 'those on Sheepstor and in the Merrivale warren . . . where their height is 4 or 5 ft', and the linear embankments associated with rabbit warrens at Allerston in the North Riding are quite distinct from the conformation at Pompocali, as also are the mounds north of Hutton-le-Hole which, it has been suggested, may have such an association, and the Coney Garth at Rigton (Richardson *et al.*, 1775–78).

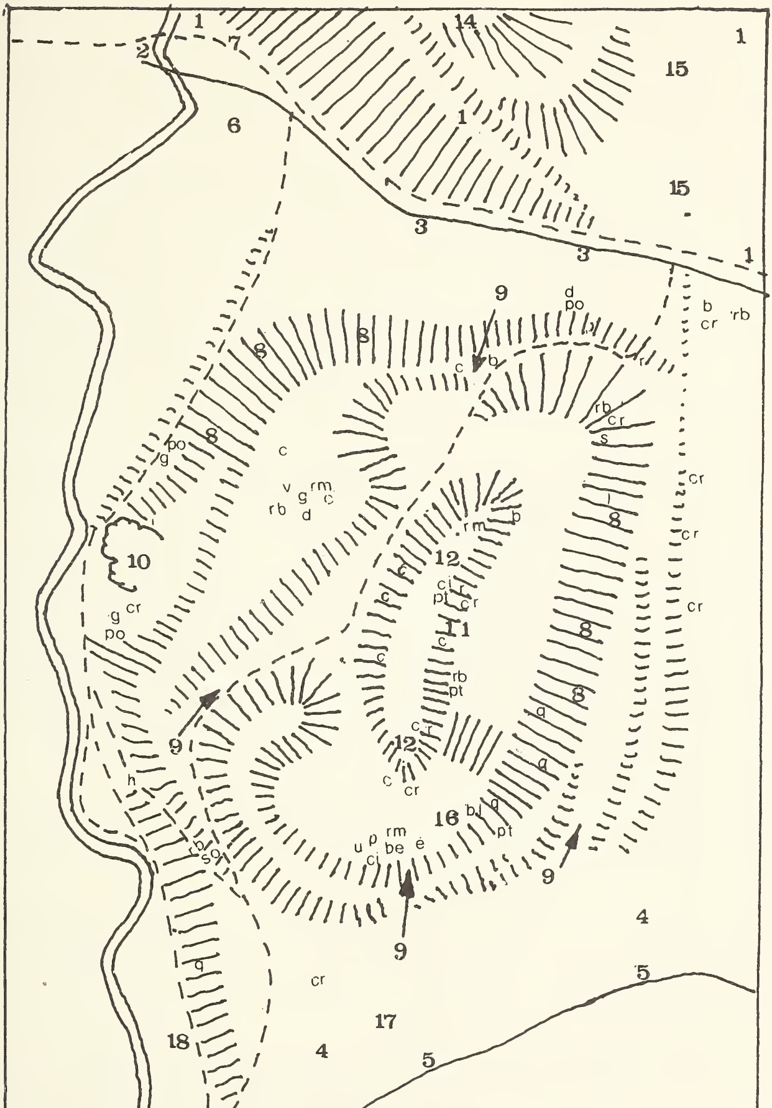
Nevertheless, until the advent of myxomatosis in 1954, the place would no doubt be regarded by its owners and others, invited and uninvited, as a ready and desirable source of food, fur and sport. One of the paths leading from Pompocali, for instance, runs into the old hunting road along the east border of Hetchell Wood above the Crags. Before the end of the eighteenth century, when rabbits were scarcer, their 'sweet meat and the fineness of their fur' (Sheail, 1970) were estimated much higher. It is interesting to note in this connection that in the nearby 'township of Rigton' the Enclosure Commissioners (Richardson *et al.*, 1775–78)

Fig. 5. Sketch-map of Pompocali with selected geological, ecological and other data (opposite page).

1 = Hetchell Wood Nature Reserve
2 = Ford
3 = Parish boundary
4 = Cutting –– route of Roman road (Ramm 1976)
5 = Hedge with species count of four
6 = Marsh
7 = Powerful spring
8 = Heavily terraced areas with *Cladonia* spp. and *Lecidea uliginosa*
9 = Entry/exit points to quarry
10 = '20 foot Crag. Coarse falsebedded sandstone and gravelly grit' (Edwards 1938)
11 = Steep slope (carefully packed?)
12 = Stones at surface
13 = Area designated 'Quarries' on 1790 plan. Face a little further south 'Coarse gravelly grit 6 foot' (Edwards 1938)
14 = Camp. Used as a camping site over recent years
15 = East of these points and west of Hetchell Wood limestone quarry unwooded on 1909 O.S. map
16 = 'Coarse sandstone with pebbles' (Edwards 1938)
17 = Traces of Magnesian limestone — glacial drift?
18 = Glacial deposit traces in embankment

Scarcroft Beck runs left-south to left-north. Footpaths are shown by broken lines. The footpath leaving Pompocali to the north-east connected with the north-south running hunting path along the east border of Hetchell Wood above Hetchell Crags.

b = *Betula pubescens* (Downy birch)
be = *Bellis perennis* (Daisy)
bl = *Blechnum spicant* (Hard fern)
c = *Calluna vulgaris* (Heather)
ci = *Cirsium vulgare* (Spear thistle)
cr = *Crataegus monogyna* (Hawthorn)
d = *Deschampsia flexuosa* (Wavy hair grass)
e = *Endymion non-scriptus* (Bluebell)
g = *Galium saxatile* (Heath bedstraw)
h = *Holcus mollis* (Creeping soft grass)
i = *Ilex aquifolium* (Holly)
l = *Lonicera periclymenum* (Honeysuckle)
p = *Plantago lanceolata* (Ribwort planta
po = *Potentilla erecta* (Tormentil)
pt = *Pteridium aquilinum* (Bracken)
q = *Quercus petraea* (Sessile oak)
r = *Rosa canina* (Dog rose)
rb = *Rubus fruticosus* (Bramble)
rm = *Rumex acetosella* (Sheep's sorrel)
s = Stump, covered by *Lecidea scalaris*
so = *Sorbus aucuparia* (Rowan)
u = *Urtica dioica* (Stinging nettle)
v = *Vaccinium myrtillus* (Bilberry)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awarded to the Reverend Thomas Pollok and his wife as Lord and Lady of the Manor, in 'Compensation for their Right and Interest in the Soil of the said Commons and for their free Warren thereon', 'such part, share and proportion of the said Commons or Waste Lands as . . . should be of the annual Value of ten Pounds. . . .'

The geologist's view of Pompocali was put by Edwards *et al.* (1950) in their examination of the area's East Carlton Grit of which the middle band 'is a coarse, pebbly sandstone, seen in small exposures and in a 10 foot section at Rowley Sand Quarries 6 furlongs south of Bardsey Church. It is overlain by Magnesian limestone at Hetchell Crag, 6 furlongs south-east of Bardsey Church where 25 feet of very massive coarse grit is exposed in vertical faces and was formerly quarried at Pompocali 300 yards further south.' Various features of the site confirm this interpretation of its physiognomy. Fig. 5 records a selection of geological, industrial archaeological and ecological information derived from a study of the *superficies* of the site and of relevant geological (Dakyns, 1872; Edwards, 1938), O.S. and other maps to date. There is no evidence that the site's conformation is glacial in origin, despite the presence to the south and south-west of a few traces of glacial deposit. A little Magnesian limestone which may be glacial drift is on or near the route Ramm proposes for the Roman road through the cutting, now a heavily worn farm track. Given the road's passage immediately by Pompocali, it seems unlikely that the Romans would fail to make use of stone adjacent to their line of work. In this neighbourhood the gritstone from Pompocali itself and limestone from close by would both be readily available. Bogg (1902) noted of a stretch of this road *c* 1 km eastward: 'An old man, upwards of fourscore, told us that sixty years ago, he assisted in the breaking up of Stubbing Moor, and at that time the site of the road was laid bare, and a vast quantity of large irregular blocks of stone were carted away.'

An attempt to date the hedge on the southern side of this cutting using the method of species counts (Hooper, 1970; Pollard *et al.*, 1974) was inconclusive and illustrated the need for comparative work of this kind in such parts of Yorkshire. Species counts were obtained for several hedges near Pompocali. Results suggested that, in so far as extrapolation on the principle of one species per century of age can reliably be applied here (cf. Fowler, 1974), the cutting hedge, with a species count of four, might have a probable age of three or four centuries. The stretch of hedge running west-east into which it merges to the north-east and which can be shown from the documentary evidence of Teal's Plan to be later than 1790, has a species count of two. With a recognised margin of error of two centuries either side of dates obtained in this way, however, and with a dearth of documented hedge dates from the area, it would be unsound to rest any conclusion on these data.

Teal's Plan indicates that any quarrying must have ceased at Pompocali by the mid-eighteenth century at the latest, since the woodland shown there persisted into the present century (see below). The field names, Kiln Close and Limekiln Close in the Valuation, are evidence that the lime quarry by Milner Lane 300 m east of Pompocali, was in use by this date. Working continued until the present century. The small quarry by the Corn Mill south of Pompocali is, on the other hand, described as Pasture in the Valuation and was evidently out of use when the Valuation was drawn up. This gives some support to the notion that some of the stone for the mill may have come from this quarry. Repairs and improvements carried out by George Lane Fox in 1817 utilised stone from the demolition of part of the old hall at Alwoodley (Jewell, 1822).

Something of the probable order of work at Pompocali can be visualised if the site is viewed from the banking north of the cutting previously mentioned. In places the mounds are seen to rise above the original lie of land, a feature typical of overburden/spoil. Some parts of the embankments appear to be undisturbed ground. Note in this connection the *in situ* boulder near the holly by the stream (Fig. 5). The crag by the stream, a fine example of false-bedding, would indicate to the early searcher that stone might be found in quantity immediately east. Four points of entry/exit to the workings can be seen, related to different levels of work in the quarry.

The lack of local records concerning Pompocali leaves open the possibility that quarrying persisted into the mid-eighteenth century. As suggested above, tne name, Coney Garth Spring on Teal's Plan could denote a fairly recent plantation. Equally possible is an earlier

date for the cessation of working there. In the absence of detailed local notes among Warburton's survey sheets and other papers it is uncertain whether he intended his Pampocalia to occupy the precise ground of today's Pompocali. The position of Warburton's Pampocalia is fixed entirely by the crossing of his two Roman roads. The most one can say is that, if he visited the present day site (and, given his cartographic method of exploratory survey and his antiquarian fervour, such an examination is most likely), he considered it part at least of his Roman station. If this is the case, he evidently did not see the site as merely abandoned quarry workings, and work may well have ceased at least some decades prior to such a hypothetical visit. This could date the cessation of working at some time in the seventeenth century or even earlier. The building, laying and repair needs of local roads, farm tracks, walling, dwellings and work-buildings, etc., may in any case have encouraged intermittent bouts of activity over very many years, possibly from Roman times, but certainly only organised *modi operandi* would have left the earthworks seen today.

Having outlived any use as an active quarry, Pompocali merged into the local landscape; Dixon (1855) described it as 'covered with a thick plantation which adds a gloom to this secluded spot'. Some time prior to his death in 1910 Mr John Revis, whose main source of livelihood was the Corn Mill south of the site, hung the carcasses of his animals over the branches of the Pompocali oaks after foot-and-mouth had attacked his stock (Mrs G. R. Musgrave, *pers. comm.*), and local memory still recalls the mid-field bonfires on such sorry occasions (Miss V. Watson, *pers. comm.*). The oaks were felled during the economic depression of the 1930s (G. E. Cornforth, *pers. comm.*).

Bartley (1970) has summarised the vegetation of such sites: 'Where woodland is removed but without direct cultivation, scrub and grassland develop. . . . In certain areas a heath vegetation may develop with an abundance of ling and sometimes gorse *(Ulex europaeus)* and birch. Such heaths are found on the earthworks near Hetchell Crag and on sandy areas near Adel and Alwoodley'. The further vegetational data included in Fig. 5 accord with the picture of a limited flora of a sort one might expect on a disused earthworks which has seen a considerable period as woodland.

Although, then, Pompocali appears to have no claim to be the remains of a Roman station and although it is, as Horsley (1732) wrote, 'certainly a more substantial happiness to find our country in most parts a pleasant garden instead of a series of Roman garrisons', it is nonetheless to be hoped that Bodington's plea (1895) for the removal of the name from O.S. maps on the grounds of rationality will continue to be resisted. Despite the name's eccentric genesis, this 'small, familiar patch of ground' (Greene, 1938) has character enough and position (so near the meeting of the Magnesian limestone and Millstone Grits) to justify the retention of a name uniting those of two Roman stations, one on the limestone, the other on the grit. Having won local acceptance, it would be regrettable for it to disappear from the map of Yorkshire.

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BOOK REVIEWS

A Field Guide to the Seabirds of Britain and the World by **G. S. Turk**, and illustrated by **Hermann Heinzel.** Pp. 292. Collins, Glasgow. 1978. £5.25.

Described by the publishers as 'A comprehensive guide: 781 birds painted in colour, 138 line drawings, 313 maps', this book is a worthy successor to Alexander's *Birds of the Ocean.* After a useful introduction covering seabirds generally, the author deals with each family in turn in 122 pages of text with line drawings. The 48 colour plates follow, then thirty pages of small distribution maps packed ten to a page. British seabirds, with larger distribution maps, are given special attention at the end. In spite of minor reservations over details, I have no hesitation in recommending this book to anyone wanting a comprehensive guide to either British or world seabirds.

B.S.

Wildfowl of the World by **Eric Soothill** and **Peter Whitehead.** Pp. 297, with 128 coloured plates and 128 distribution maps. Blandford Press. 1978. £7.50.

Essentially an incomplete collection of colour photographs of the world's wildfowl, with accompanying plumage descriptions and distribution maps, together with observations on status and behaviour. There are sections on the classification and characteristics of wildfowl groups, and the location of wildfowl refuges and captive collections around the world, and a wealth of useful and up-to-date information on the present known status and distribution of all species described. The book is very readable, well designed and pleasing to look at and handle.

However, in recent years many excellent definitive books dealing with specific groups of wildfowl have appeared, and any new work, particularly with a coverage as wide as this one should be the result of the most meticulous market research. Alas, this appears not to have been the case. There is no clear indication of the book's objectives, nor the market level it aims at. This lack of clear purpose has led, inevitably to numerous confusing errors, omissions and inconsistencies in the text, plates and distribution maps.

Technically competent and aesthetically pleasing though the plates may be, all but a handful of them are of captive birds, with the inevitable background of balding grass, feathers and faeces. If included for pure pleasure why could not the plates have been of wild birds? Photographs of even the rarest and most inaccessible species now exist. If intended for identification purposes, drawings showing a variety of plumage stages would have been more suitable.

Although the introduction says that the plates would deal only with full species, yet plates, text and maps for such subspecies as the Pink Footed Goose, Green Winged Teal and Greater Snow Goose are included.

The photographs of northern (European) Shoveler and the Australian Shoveler (a very different bird) have become transposed in the book, and now relate to the wrong text, as is the case with the European Scaup and Lesser Scaup. Some of the distribution maps too are unreliable and inconsistently compiled. The Magpie Goose does not occur throughout Australia as the map suggests, the Australian Shelduck should not occur in New Zealand as is shown, and the European Marbled Teal does not occur in southern France and throughout Italy as the map would lead us to believe. The Fulvous Whistling Duck occurs commonly in countries such as India and Burma, but does not appear anywhere in Asia on the map. The feral populations of the Mute Swan in Australia, New Zealand and U.S.A. are not shown on the map, but the European feral populations of the American Canada Goose are.

Most confusing of all, the map of the Common Eider shows only the distribution of the main species: a glance at it would suggest that this abundant circumpolar species only occurred in Iceland, Britain and Scandinavia.

In the large section of the book listing the important wetland refuges for wildfowl in the world there are also a number of peculiarities. Alaska is not treated as part of the U.S.A.,

and no mention is made of the general importance to wildfowl of the Yukon river system. No reference is made to the winter wildfowl refuge of the Camargue, and the vast, vital and wonderful wildfowl refuges of India, apparently, do not exist. The river delta system separating Greece and Turkey is confusingly referred to by two different names.

Although the book is a useful vehicle for the wildfowl conservation cause, there are too many obvious inconsistencies and inaccuracies to regard it as the 'standard work' which the cover of this book optimistically suggests it might become.

M.D.

Ferrets and Ferreting by **I. Brodie.** Pp. viii + 79, including 18 photographs and 4 line drawings. Blandford Press. 1978. £2.95.

A useful, practical book on the care and training of ferrets supplemented by information on their natural history and an outline of ferreting practice. The monochrome photographs are good and the line drawings clear and informative. A readable, well-presented account of such aspects as diseases, housing, feeding, and breeding of ferrets as well as hunting with and training of these animals.

M.J.D.

The Penitent Butchers by **Richard Fitter** and **Sir Peter Scott.** Pp. 48, including 10 line drawings. Fauna Preservation Society, London. 1978. £2.50.

This is a short commemorative account of the work of the Fauna Preservation Society since its inception as the Society for the Preservation of the Wild Fauna of the Empire in 1903. The book makes most interesting reading as tightly condensed within its forty-eight pages is the story of the society's active and influential role in wildlife conservation. This has been implemented through the society's own efforts or alternatively in collaboration with numerous other conservation bodies such as the World Wildlife Fund, International Union for the Conservation of Nature, R.S.P.B. and the S.P.N.C. being many of which were established with the support of F.P.S. In this book we hear of the F.P.S. role in such diverse activities as the establishment of national parks in Africa, international protection of migratory birds, the conservation of British wildlife, the control of trade in rare animals and their products, the protection of whales and the establishment of captive, breeding colonies of rare animals. An interesting, informative account.

M.J.D.

Wildlife Sounds and their Recording by **Eric Simms.** Pp. xvi + 144, including 28 figures and 16 plates. Paul Elek, London. 1979. £5.95.

An account of how animals make sounds and how these sounds are recorded. Mr Simms has vast experience of this field and can describe from his own knowledge the way in which his subject has developed, tracing the development and the technique of tape recording, microphones, reflectors, miniaturisation, etc. This is all placed in the context of practical field problems and scientific research. A most useful guide for those with a technical interest in sound recording of animals.

M.J.D.

North American Moose by **Randolph L. Petersen.** Pp. xi + 280. University of Toronto Press. 1978 (reprint of 1955 ed.). $13.50, paperback.

Starting with a palaeontological history and then using the sightings of Indians and explorers, the author provides information on man's first contact with the North American Moose. By adding his own extensive field work, an organised and very detailed text is produced on this large animal. Growth rates, sizes, diseases, and feeding preferences are listed in table form, all carefully checked by analyses of carcasses and browsing patterns.

The text is only speculative where evidence is obtainable from few sources. Thus in the area of general behaviour and predation, the author admits the need for further study. However this type of information is difficult to obtain because of the extreme wariness of this animal in the wilderness.

While tracking moose, I have frequently been able to locate them by their habit of calling to each other. These low-toned calls have many variations depending on the size and sex of the animal, and seem to indicate both awareness and location to each other. However, the author makes no mention of this rather interesting characteristic.

This book is the culmination of many years' research in the bush and no serious study of the North American Moose could be accomplished without reference to this volume.

B.O.

Life on Forty Acres by **B. P. Moore.** Pp. 184. E. W. Classey, Faringdon. 1978. £5.50.

Subtitled 'A saga of Australian rural life' and 'Some experiences of a naturalist living in the Australian bush', this attractive book is written by a professional biologist — a Pommy at that — who has the good fortune to own and cherish a parcel of backwoods land not far from Canberra. He has come to terms with the flies, and enjoys to the full the menagerie of animals — from scorpions to kangaroos and sugar-gliders — that share his property. Illustrations by the author enliven the text. A book to watch out for and enjoy when you find it.

B.S.

Animals my Teachers by **Michel Klein.** Pp. 316. Collins and Harvill Press. 1979. £6.95.

Dr Klein is a French veterinarian with a practice close to Paris, who works especially with exotic animals from circuses, zoos and safari parks. This book tells of his experiences, in a veterinary world far removed from the rural idyll of our own James Herriot, and infinitely more alarming. Well illustrated with photographs of the author dealing nonchalently with ailing elephants, hippos, giraffes, lions, bears, and zebras. An entertaining book, with a thoughtful text well translated.

B.S.

Insects are Animals Too by **Anthony Wootton.** Pp. 130. David & Charles. 1978. £3.95.

In spite of Mr Wootton's obvious enthusiasm for his subject and the delight he takes in sharing his pleasure with others, the fact remains, however, that before any meaningful study can be undertaken of the insect as a living animal it is necessary to know the name of the species that is the object of the study. This implies at least a basic knowledge of taxonomy which can only be satisfactorily acquired, in my view, by forming a collection, a traditionally important aspect of amateur entomology which the author relegates to a minor, secondary role. The book contains some interesting facts and it is illustrated with black and white photographs and line drawings.

R.C.

Looking at Insects by **Colin Guthrie** and **Colin Dann.** Pp. 87, with 41 illustrations. Kenneth Mason. 1978. £3.00.

This book is intended for those with no prior knowledge of insects, and seeks to stimulate interest by describing the biology of familiar types such as butterflies and beetles, in very simple language. The text is readable and fairly informative, but by no means entirely accurate or free of errors. The illustrations are most unfortunate. The mosquito biting the hand that feeds is of nightmare proportions, while 'Violet ground beetle attacking worm' is a masterpiece of inartistic imprecision.

Compared with Michael Tweedie's *Insect Life* (see *Naturalist* **103**:35) this book is not a good buy, but might be preferred where a really elementary treatment is required.

S.L.S.

A Key to British Species of Freshwater Triclads by **T. B. Reynoldson.** Pp. 32 including numerous line drawings, plus coloured plate. Scientific Publication No. 23. Freshwater Biological Association, The Ferry House, Far Sawrey, Ambleside, Cumbria LA22 0LP. 2nd edition, 1978. £1.30.

Considerable revision of 1st edition, which appeared in 1967 (see *Naturalist*, 1967, p. 107), adding a new species, and providing a new key and more ecological and bibliographical information.

Collins Handguide to the Trees of Britain and Northern Europe by **John Wilkinson** and **Alan Mitchell.** Pp. 96. Collins. 1978. £1.95.

About 125 different trees are covered in this compact and easily portable book which includes all our native species and those most commonly met with in parks and gardens. The text is simple, every tree included is illustrated and since John Wilkinson's colour paintings are uniformly elegant and realistic it is these which are the most appealing feature of this book.

W.A.S.

The Identification of Flowering Plant Families by **P. H. Davis** and **J. Cullen.** Pp. 114 with 8 text figures. Cambridge University Press, 2nd edition. 1979. Hardback £6.00; paperback £1.95.

This new edition of a book originally published fourteen years ago incorporates many changes. The authors have a long experience in teaching taxonomy and the improvements and alterations introduced into this edition combine to make it authoritative, up-to-date and probably as free from the pitfalls which beset the pathway of key-construction as can be achieved. The indented keys of the first edition have been replaced by bracket keys and the sequence of families has been changed. There have also been considerable changes made in the introductory matter, designed to increase clarity in the usage of terms and hence the practical value of a book which will be of permanent value to professional and amateur botanists and enquiring gardeners.

W.A.S.

Key Works to the Fauna and Flora of the British Isles and North-western Europe edited by **G. J. Kerrich, D. L. Hawksworth** and **R. W. Sims.** Pp. xii + 179. Systematics Association Special Volume No. 9, Academic Press, London. 1978. £7.80.

A completely revised *Bibliography of Key Works*, last published in 1967, with extended scope to cover publications dealing with the identification of plants and animals not only in the British Isles but also in Scandinavia, Iceland, West Germany, Belgium, Holland, Luxemburg, and France north of lat. 49°. An indispensable reference work which should definitely be added to the bookstock of all libraries and natural history museums.

Man and the Landscape in Ireland by **F. H. A. Aalen.** Pp. xii + 343. Academic Press, London. 1978. £9.90.

A well-presented account of the impact of man on the Irish landscape over the past 8000 years. The text is ably supported by 27 figures, 22 pages of black and white plates, and a comprehensive 22-page bibliography. The book will prove particularly rewarding to environmentalists and landscape architects, and chapter 1 on 'The Natural Habitat' will be of special interest to natural historians and geographers.

Ecological Methods, with particular reference to the study of Insect Populations by **T. R. E. Southwood.** Pp. xxiv + 524, with numerous text figures and tables. Chapman and Hall. 1978, 2nd edition. £10.00.

An extensive revision of a standard work, first published in 1966, intended not only for the undergraduate, research worker and teacher, but also for the amateur animal ecologist. Comprehensive coverage is given to such aspects as: population measurements; estimation of natality, mortality and dispersal; age-specific life-tables; sampling from plants, vertebrate hosts, air, soil, and water; marking techniques; construction of energy budgets; and ecological modelling.

All sections give special attention to experimental techniques (notably those dealing with animal trapping and sampling), mathematical interpretation, and a critical evaluation of a judicious selection from the overwhelming flood of ecological literature.

Some chapters have been completely or largely rewritten for this new edition, and important new sections have been added to others; furthermore, nearly 1000 new

bibliographic citations have been added, and it has only been necessary to delete a few older references.

Ecologists are greatly indebted to Professor Southwood for providing them with an indispensable work of reference.

M.R.D.S.

The Voyage of Charles Darwin. His autobiographical writings selected and arranged by **Christopher Ralling.** Pp. 183, including numerous coloured and black and white photographic plates, map and 2 portraits. BBC publication. 1978. £6.75.

A judicious and very readable selection from Darwin's writings designed to complement the excellent BBC television series. Mr Ralling has concentrated his material so as to chart the slow growth of Darwin's theory of evolution from its first tentative inception to its final form, and highlights how in his diaries of the *Beagle*'s voyage Darwin had no inkling of the far-reaching repercussions of his first speculations on the origin of species. Highly recommended.

In the Presence of Nature by **David Scofield Wilson.** Pp. xix + 234, including 23 monochrome plates and coloured frontispiece. University of Massachusetts Press. 1978. $15.00.

The American natural historians John Bartram, Jonathan Carver and Mark Catesby, astonishingly described as "three rather undistinguished figures" in the introduction (p. xiv), are considered in this book from a mainly literary standpoint. Is it necessary to "rediscover" figures who will surely always be remembered for their scientific and topographic achievements? Their observations of natural events through words or illustrations are a sufficient memorial. This book examines the literary styles and philosophies of the three "nature reporters". The reviewer found the author's own style pretentious and verbose, heavily laced with jargon and patches of purple prose. The publishers are, however, to be congratulated on the high standard of production.

M.R.D.S.

Biology: Its Historical Background by **Howard B. Baumel.** Pp. vi + 101, including 14 illustrations (mainly portraits). Philosophical Library, New York. 1978. $6.00.

A gallop through 2500 years of medical, rather than biological, history. Oversimplification results in carelessly expressed information, such as "The Hebrew conception of nature is preserved . . . in a supplement to the Bible called the Talmud" (p. 2) and "During his free time Mendel mated pea plants in the monastery gardens . . ." (p. 56). Not recommended.

The Gamekeeper at Home and **The Amateur Poacher** by **Richard Jefferies.** Pp. 352. O.U.P. 1978. £1.95, paperback.

A Victorian Poacher by **James Hawker.** Pp. 114. O.U.P. 1978. £1.50, paperback.

The Oxford University Press has performed a useful service by reprinting as paperbacks these contrasting books on similar themes. The authors both spent their youth in poor circumstances in the countryside of southern England during the middle years of the nineteenth century, and both were acute and sensitive observers of nature. Jefferies wrote to improve his lot, was successful as a novelist, and died young at the age of 39; the works noted here were first published a hundred years ago. Hawker remained a poacher until his death at the age of 84, and wrote his reminiscences in his old age without thought of publication; they first appeared in 1961, and then only in the present edited version. Even so, they have an immediacy which is lacking in Jefferies' more polished prose, and make the more interesting book of the two.

F.H.B.

Call It a Summer Country by **Edward Storey.** Pp. 208 (including map), plus 24 plates (37 photographs by **John Baguley**). Robert Hale. 1978. £4.95.

Descriptions and reminiscences of the Fen Country (mainly Cambridgeshire), containing a distillation of historical and literary material, several new poems by the author, and topographical information of interest to the naturalist.

The Midsummer Cushion by **John Clare**, edited by **Anne Tibble** with the assistance of **R. K. R. Thornton**; illustrations by **Birtley Aris.** Pp. xxii + 519. Mid-Northumberland Arts Group/Carcanet Press, Manchester. 1979. £8.00.

The text of 361 of Clare's poems, almost a third of which are published for the first time, has been exactly transcribed as far as possible from the original manuscript (prepared before the end of 1832) now housed in Peterborough Museum.

The poetry deals with countryside matters and natural history, and reveals Clare's powers of observation. His works recreate in vivid detail the English landscape (mainly Northamptonshire) during the early nineteenth century, and provide a wealth of plant and animal records for that period.

The editors are to be commended for their diligence in assembling definitive material, but the introductory matter relating to Clare's life and works (particularly *The Midsummer Cushion*) is somewhat limited for such an important work as this. If the limitation is based on the premise that 'most of this has been said before', then a critical appraisal of the published material and a detailed bibliography should have been included. A glossary and index of titles and first lines are provided.

M.R.D.S.

Also received:

Twelve Little Housemates by **Karl von Frisch.** Pp. 155, with numerous text plates and line drawings. Pergamon Press. 1979. £5.00 hardcover, £2.50 flexicover.

Enlarged and revised edition of a popular book describing insects and spiders which have deserted their natural surroundings to live in our homes.

Mammals — Their Latin Names Explained by **A. F. Gotch.** Pp. 271. Blandford Press. 1979. £5.95.

Translation into English of the Latin generic and specific epithets, some explanation of the reason for these names, and a brief description of the animal's world distribution, are provided for more than 1000 mammals in 19 orders.

The Yorkshire Derwent. A Case for Conservation by **Joan Burnett** and others, and edited by **Stephen Warburton.** Pp. 73. 1978. Copies, £1.50 including postage, obtainable from 20 Castlegate, York.

Report on captive hawks by the joint working group of the Advisory Committees on the Protection of Birds for England and Wales, and for Scotland, Department of the Environment. Pp. 10. H.M.S.O. 1979. No price.

This report identifies pressures on wild stocks of diurnal birds of prey in Britain, due to growing popularity of falconry. It recommends licencing, recording and banding under supervision of all captive hawks, however acquired, to prevent illicit trading.

Hebridean Naturalist: Magazine of the Western Isles Natural History Society, vol. 1, no. 1/2, Summer/Winter 1978. Pp. 84. To be issued twice a year in June and December, each issue of 40–50 pages; annual subscription £2.50.

Covers geology, botany, zoology, and archaeology in the Outer Hebrides; articles accepted in either English or Gaelic. For information contact Mrs M. E. Thompson, Am Fasgadh, 5 Rathad na Muilne, Stornaway, Isle of Lewis.

A Plank Bridge by a Pool by **Norman Thelwell.** Pp. 160, with illustrations by the author. Eyre Methuen. 1978. £5.95.

A very readable account of how one man achieved, almost single-handed, his childhood dream of possessing his own private lake complete with its associated wildlife. The numerous illustrations throughout the text are a particularly attractive feature. (Readers expecting to find any of rotund little girls on mutinous ponies will be disappointed!)

WILLIAM MUDD: REQUEST FOR INFORMATION

Research is currently being carried out on the life and work of the lichenologist William Mudd (1830–79); he was born in Bedale, Yorkshire and died at Cambridge, but he spent most of his life in the Cleveland area. He was a gardener at Great Ayton and in 1865 he was appointed Curator of the Botanic Garden, Cambridge. His major work, *A Manual of British Lichens*, was published privately in 1861, and was based to a large extent on his extensive fieldwork in North Yorkshire. His considerable herbarium material is to be found in many collections scattered throughout Britain. He also issued an *Exsiccata* to accompany his *Manual*, and in 1865 his *A Monograph of British Cladoniae*, comprising both a printed text and representative specimens of the taxa treated, was published privately. Some further details of Mudd's contributions to lichenology are to be found in Hawksworth, D. L. and Seaward, M. R. D. (1977) *Lichenology in the British Isles 1568–1975.* However, biographical details on this important lichenologist are limited, and any information on the following would be much appreciated:

(1) Biographical data, including the whereabouts of any of Mudd's correspondence and MSS.
(2) Biographical data on Mudd's co-worker, George Dixon.
(3) Identification of the following localities associated with Mudd's field records: Bandale, Brantsdale and Brentsdale (probably Bransdale); Beech (or Buck) Bank (probably in Kildale area; Bridle Gill (probably near Roseberry Topping); Cockshaw and Cockshaw Bank (probably near Great Ayton); Hoggarts (or Hoggets) Wood; Howden Gill (probably near Roseberry Topping); Larch Bank; Oggeray Gill (also cited as Oggeray Hill and Oggery Hill) — a site of significant lichenological importance; Sowerdale; Stockton Park.
(4) The availability for purchase of a copy of Mudd's *A Manual of British Lichens.*

Expenses to cover cost of postage, photocopying, etc., will be gladly refunded, and any help acknowledged. Information should be addressed to:

Dr M. R. D. Seaward
University of Bradford
Bradford BD7 1DP

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The Y.N.U. Newsletter, sent to all Full members and Affiliated Societies, is published twice a year: May and September. Its aim is to provide a means of intercommunication between all members by giving, for example, reports on Y.N.U. and Society meetings and activities, items of broad Natural History interest, details of types of surveys and enquiries. All items should be sent to the Newsletter Editor: Mr H. T. James, 238 Sigston Road, Beverley, Yorks.

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It is proposed to start an album of photographs of interest to the Y.N.U. We would be very glad to receive prints of people or events either as a gift or on loan for copying, with dates and as much information as possible. We hope the collection will stretch from the early years of the Union to the present day and become part of the Y.N.U. Archives.

Please send to Mrs J. E. Duncan, 23 Rupert Road, Ilkley LS29 0AQ.

REQUEST FOR INFORMATION: FORGET-ME-NOTS

Philip Shaw of Bradford University is researching the ecology of aquatic *Myosotis* species — *M. brevifolia*, *M. caespitosa*, *M. scorpioides* and *M. secunda*. He is eager to visit sites where these species occur and would be grateful for information reporting the location (if possible, 6 figure grid reference or sketch map) of populations of these species in the north of England.

P. J. Shaw, Department of Environmental Science, University of Bradford, Bradford BD7 1DP.

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THE STATUS OF GOLDEN PLOVER *(PLUVIALIS APRICARIA)* AND DUNLIN *(CALIDRIS ALPINA)* IN UPPER WHARFEDALE

M. V. BELL

Wharfedale Naturalists' Society

The study area for this work was first visited during the Atlas Survey (Sharrock, 1977), and since then the areas containing the most birds were visited fairly regularly up to 1975 in an attempt to discover the breeding status of Golden Plover and Dunlin in Upper Wharfedale.

Methods

Most of the one-kilometre squares of the National Grid around the Wharfe watershed were visited on at least one occasion in the summers of 1970 to 1975 between mid-May and early July; extreme dates for the study of breeding density were 26th May and 1st July. Territories were counted when birds were found which behaved as though holding a territory, that is a pair or a 'territorial male'.

Golden Plover are very easy to locate when on the breeding grounds as an intruder is escorted through the territory by the off-duty bird or sometimes the pair. The plaintive warning cry is usually uttered from a conspicuous vantage point when the observer is up to 400 m away. This behaviour makes an underestimate of the number of territories unlikely and any errors are likely to be toward overestimating the number of birds present. However, in areas where the population was fairly dense it was common to witness the changeover of escorting birds as one territory was left and the neighbouring one entered. In such circumstances there was no doubt as to the position of the territorial boundaries.

Dunlin are far easier to underestimate because the territorial defence against intrusion is much weaker and, therefore, birds could be overlooked. However, the favouring of areas adjacent to small tarns and damp mosses dominated by cottongrass *(Eriophorum vaginatum)* meant that such places could be worked more thoroughly when the breeding density was determined. The author used the same criterion as Yalden (1974) in determining territorial birds, that is, Dunlin which stood their ground and gave the anxiety cry or were in song, but not those apparently surprised which flew away.

Three areas were chosen for the more detailed studies on territorial density. These were:

1. The top of Fountains Fell, visited in 1972, 1973 and 1975, and neighbouring Darnbrook Fell, visited in 1973.
2. The moor between Littondale and Upper Wharfedale, Old Cote Moor visited in 1973, and Birks Moor — Horse Head Moor — Cosh Inside, visited in 1974 and 1975.
3. The ridge between Upper Wharfedale and Raydale, Cray Moss — Yockenthwaite Moor — Oughtershaw Moss — Fleet Moss, visited in 1973, 1974 and 1975.

Two-thirds or more of the summit ridges of these moors were covered to give territorial densities, and total holding capacities were then calculated from these, providing the habitat was similar. Comparison of the areas between years was carried out by following as nearly an identical route as possible.

Distribution

Golden Plover were found to be present on all the moorlands visited regardless of habitat type. They were almost as numerous in areas with deeply dissected peat-moss and heather *(Calluna vulgaris)*, e.g. Fountains Fell and parts of Yockenthwaite Moor, as in areas dominated by *Eriophorum*. The crown of Darnbrook Fell is predominantly dissected peat-moss with well-grazed bilberry *(Vaccinium myrtillus)*, crowberry *(Empetrum nigrum)*, *Eriophorum* and *Calluna* forming the plant cover. This habitat was found to support the species but at a lower density. Golden Plover were found to favour summit ridges or flat areas, though in three seasons one or two pairs were found on the steep slopes of Birks Fell above Buckden. The species was usually present down to about 1500 ft but on Hebden Moor was found down to 1150 ft. The distribution of Golden Plover is shown in Fig. 1.

Dunlin were not as widely distributed and were found on Fountains Fell, Birks Moor and Moss Top near Buckden, Cray Moss, Oughtershaw Moss, Fleet Moss, and Grassington Moor, with very few birds elsewhere (Fig. 2). The difference in distribution between Golden Plover and Dunlin is based on their different feeding requirements and has been discussed by Yalden (1974).

Status

1. *Golden Plover*

It is impossible to give a population for any year directly because all the squares were not visited during one season. The distribution map (Fig. 1) is divided into three categories, based on the best year for each square, so as to give some indication of density:

(i) squares in which only one territory was found,
(ii) squares in the census area which held two or more territories,
(iii) squares in the census area which held four or more territories.

Some large variations in numbers were found between years. Thus on Fountains Fell the estimated totals for the summit area (1950 ft+) were 7, 10 and 12 territories for the three

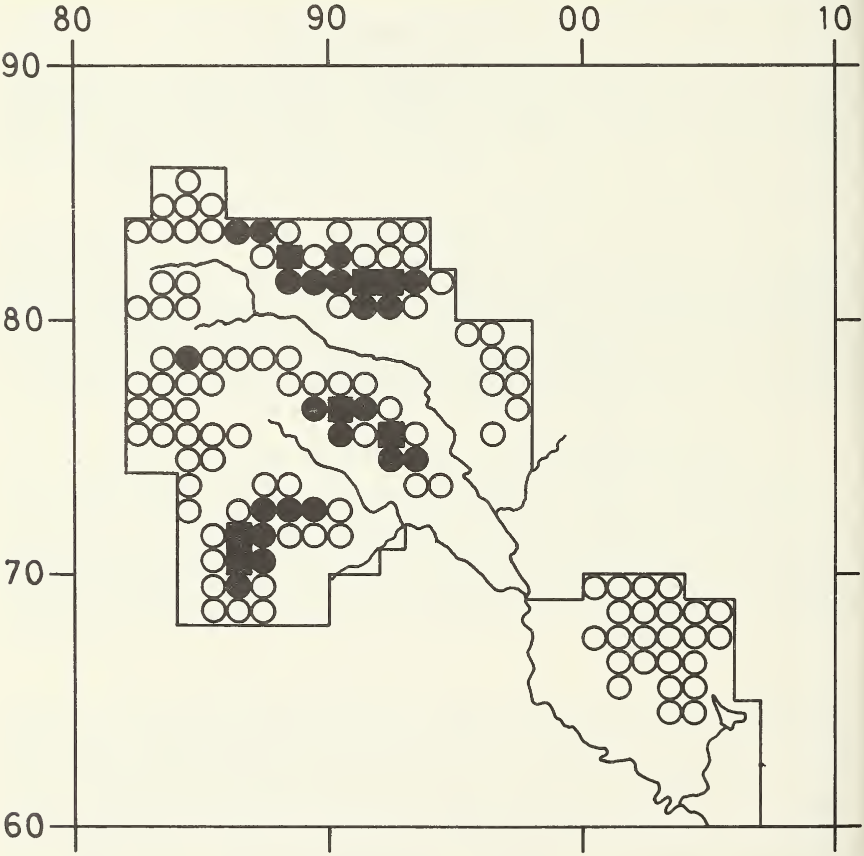

Figure 1 The distribution of Golden Plover *(Pluvialis apricaria)* in Upper Wharfedale.
○ squares in which only one territory was found
● squares which contained two or three territories
■ squares which contained four or more territories

seasons 1972, 1973 and 1975 respectively, giving a range of density from 3.4/km² to 5.8/km². A population of six pairs for Darnbrook Fell (1800 ft+) gave a density of 2.8/km². The summit ridge (1800 ft+) between Littondale and Upper Wharfedale holds about 30 pairs. Extremes of density due to habitat differences were noted on this ridge. The best areas, Moss Top and Old Cote Moor, both good *Eriophorum* mosses, gave local densities up to 6.0/km², while the worst area around Horse Head Moor where the peat-moss breaks up on limestone intrusions gave 1.3/km². On the moorland ridge (1800 ft+) from Cray Moss to Fleet Moss, 15, 21 and 10 territories were found in 1973, 1974 and 1975 respectively, giving estimated totals of 20, 29 and 13 territories and densities of 1.7/km² and 3.9/km² in the worst and best years. Extreme densities due to habitat differences were 1.5/km² on Deepdale Haw and Yockenthwaite Moor, and 5.9/km² on Oughtershaw Moss. These annual fluctuations are summarised in Table 1. The figures give a total population of 81 pairs in the census area by summating the best years for each area. Totalling up from the distribution map, a figure of 90 pairs is reached for the same area. This is slightly higher than the best total found because a good square one year was not necessarily good in other years, thus elevating the total obtained from the distribution map.

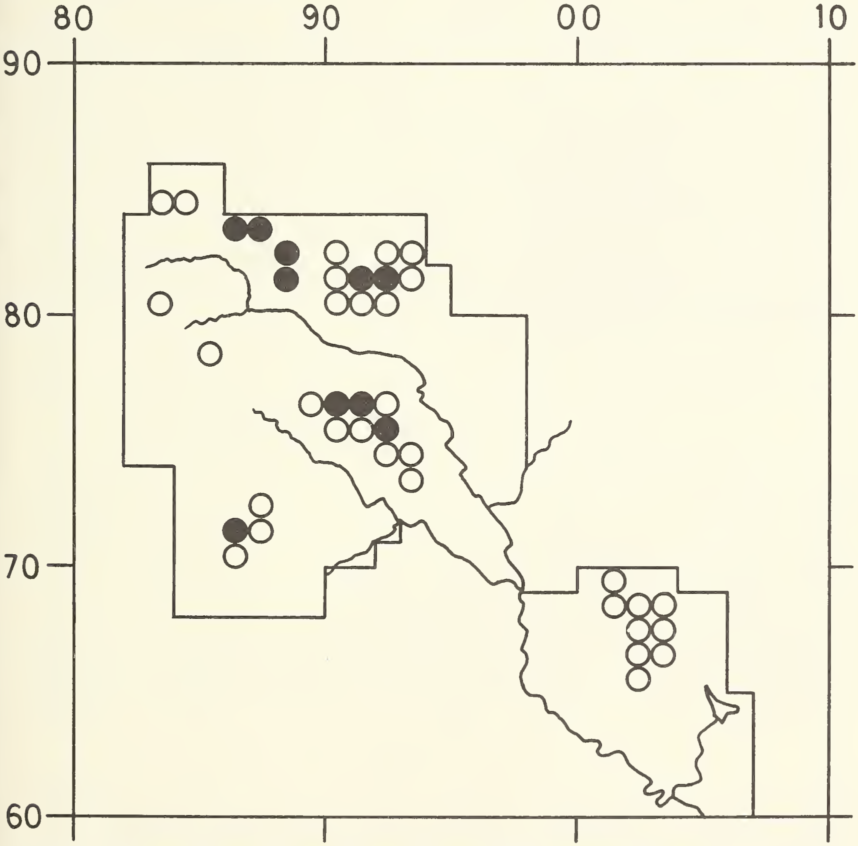

Figure 2 The distribution of Dunlin *(Calidris alpina)* in Upper Wharfedale.
○ squares in which only one territory was found
● squares which contained two or more territories

The densities on the other moors in Upper Wharfedale are low with the probable exception of Dodd Fell. If all the other squares in which the species were seen on territory (excluding Buckden Pike) are given a rating of one pair, this gives 44 pairs. The total population for Upper Wharfedale is then 124 pairs, found in 97 squares, giving a mean density of 1.3/km². The Wharfedale side of Buckden Pike appears rather unsuitable for Golden Plover and it is unlikely that more than half a dozen pairs are present in any one season. Great Whernside was not visited. Grassington Moor is largely covered by *Eriophorum* and is a good area for Golden Plover. It is probable that many squares in this area hold densities greater than 3/km²; up to 30 pairs here would be very likely. A total of about 160 pairs for the whole of Upper Wharfedale is probably attainable in a good year; in a bad year it may be as low as half this number, based on the variations found in the census area.

2. *Dunlin*

Dunlin were found to be localised round small tarns or on particularly damp *Eriophorum* mosses. Density figures were thus locally high.

Fountains Fell held 7 territories in 1972, 5 in 1973 and 6 in 1975 giving densities from 3.6 to 5.0/km². None were found on territory on Darnbrook Fell. On the moor between Littondale and Upper Wharfedale, Dunlin were concentrated in two areas, around Moss Top and Birks Tarn — Old Cote Moor. In 1973 an estimated 7 territories were found in the latter area, giving a density of 4.0/km². In 1974 an estimated 8 territories were found at Moss Top giving a density of 5.0/km². However, on 1st July 1975 no birds were found on territory in this area, the moor was much drier and had, in fact, been partly drained (see discussion). The moor from Cray Moss to Fleet Moss gave estimated totals of 10, 16 and 13 territories in 1973, 1974 and 1975 respectively, and mean density extremes of 1.3/km² and 2.2/km². The best densities were achieved on Oughtershaw Moss (4.9/km²) and Fleet Moss (4.4/km²). These figures are summarised in Table 1.

A total of 38 pairs is possible for the study area based on the best years. Elsewhere in Upper Wharfedale, Dunlin probably only occur regularly on Dodd Fell. Further down the valley, Grassington Moor appears to hold quite good numbers, though it is impossible to give a total figure without detailed study.

Table 1 Population estimates and densities for
Golden Plover *(Pluvialis apricaria)* and Dunlin *(Calidris alpina)* in Upper Wharfedale

Golden Plover	1972	1973	1974	1975	Density (pairs/km²)
Fountains Fell	7	10	—	12	3.4–5.8
Darnbrook Fell	—	6	—	—	2.8
Old Cote Moor — Birks Tarn	—	11	—	—	6.2
Birks Tarn — Cosh Inside	—	—	21	18	4.2–4.9
Cray Moss — Fleet Moss	—	20	31	13	1.7–4.0
Dunlin					
Fountains Fell	7	5	—	6	3.6–5.0
Old Cote Moor — Birks Tarn	—	7	—	—	4.0
Moss Top	—	—	8	0	0–5.0
Cray Moss — Fleet Moss	—	10	16	13	1.3–2.2

Discussion

The status of these two species in Upper Wharfedale has not been assessed previously. Holmes (1960) gave figures for Fountains Fell of 'up to 13 pairs of Golden Plover but usually many less', and 3–4 pairs of Dunlin. The figures for Golden Plover given here approach the higher end of Holmes' range and are for the summit ridge alone. The inclusion of pairs on the lower slopes would certainly raise the figure above this limit, so there appears to have been an increase in the breeding status of this species on this moor. Dunlin also appear to have increased. Both species could perhaps have benefited from the lack of keepering and maintenance of the moor in recent years.

Elsewhere no earlier data is available. The densities found here are much higher than those reported by Yalden (1974) for the Peak District. However, this study covered the optimum habitat, the summit ridges, whereas the mean density for all squares in which Golden Plover were found on territory was 1.3/km². This is lower than the figure of about 2.0 pairs/km² given by Yalden (1974), possibly due to the inclusion of some rather peripheral squares which may only hold pairs irregularly.

Some large variations in numbers from year to year were found on certain moors, but it is not known whether the total population fluctuates in such a way. It is possible that the spring weather conditions affects the number of birds taking up territories, or that a variable number of non-breeding birds hold territories. Small parties of up to seven birds, presumably non-breeders, were occasionally noted during the study, usually on areas of limestone grassland adjacent to breeding areas.

The densities of Dunlin found here are also high compared with those reported by Yalden (1974) but this is due to calculating them on a very local basis. Over the entire study area the density would be 0.4 pairs/km² but this is rather meaningless because most of the habitat appears to be unsuitable. Again some variation in numbers between years was noted. The largest was at Moss Top which in 1974 held 8 territories but in 1975 no birds were found on territory though Golden Plover were present in similar numbers to the previous year. The moss was very dry after a fine June, and inspection showed that drainage ditches had been cut along the edge of the moss over the entire area of Kirkgill Moor up to the summit ridge. It is, therefore, possible that approximately twenty per cent of the Upper Wharfedale Dunlin population could have been eliminated by one drainage scheme and it is most unfortunate that such marginal land is now considered suitable for agricultural improvement. That Dunlin are affected far more than Golden Plover by the drying out of a moor is consistent with the different feeding requirements of the two species.

Recreational pressures on these moors are generally light and neither Golden Plover or Dunlin appeared to be disturbed by walkers. The Pennine Way passed through several Golden Plover territories on Fountains Fell. On two occasions, however, damage caused by motor cycles was found. This activity could cause a great deal of damage on such a vulnerable surface as eroded peat-moss, apart from the disturbance involved. The new Langstrothdale forest intrudes into Golden Plover and Dunlin habitat, and Golden Plover have been seen on territory on a recently forested area which was formerly *Eriophorum* bog. However, it seems unlikely that modern forestry activity will ever seriously interfere with either species. Attempted agricultural improvements of these upland areas, such as the scheme on Kirkgill Moor, would, therefore, appear to be the most serious threat to the maintenance of healthy breeding populations of Golden Plover, and particularly Dunlin, in the area.

Summary

The distribution of Golden Plover and Dunlin in Upper Wharfedale has been surveyed on a one-kilometre square basis and the territorial density of both species has been estimated for the most important areas. Annual fluctuations in numbers make it difficult to put forward a firm population figure but the breeding population is estimated to be up to about 160 pairs of Golden Plover, and about 35 pairs of Dunlin, the latter figure excluding Grassington

Moor. Golden Plover were found on all the moorland visited while Dunlin were found on the wetter cottongrass *(Eriophorum)* mosses or in the close proximity to small tarns.

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BRYOLOGICAL MEETING IN THE RIPON AREA, 9–10 SEPTEMBER 1978

F E BRANSON

Both the areas visited, Picking Gill and the banks of the River Laver, used to be exceptionally good for the bryophyte hunter, but great changes have taken place and a deterioration of the bryophyte flora has resulted. In recent years, Picking Gill has been felled, replanted, and turned into a game reserve; formerly it was more open, with several high stone walls covered with bryophytes, and dense rhododendron stands. Now those walls have been pulled down, and the rhododendrons cleared. The part of the River Laver which we visited used to be very open; now the banks have become thickly wooded and overgrown, almost impenetrable in parts, as is the large quarry on the other side of the approach road. The first Yorkshire specimen of the hepatic *Pellia neesiana* was recorded by myself from this quarry in 1965, all previous records having been deleted due to confusion with other similar species of the same genus by earlier bryologists. Ninety-three species (twenty-one hepatics and seventy-two mosses) were recorded from the two areas; unfortunately some of the rarer species recorded by myself in earlier years were not seen on this occasion. A few of the more striking species are mentioned below:

PICKING GILL

The roadside wall at the entrance was one of the best rupestral habitats and produced the following species: *Tritomaria exsectiformis*, *Scapania nemorea*, *Encalypta streptocarpa*, *Barbula rigidula*, *B cylindrica*, *B recurvirostra*, *Grimmia trichophylla*, *Zygodon viridissimus* var *viridissimus*, *Drepanocladus uncinatus*, and *Rhynchostegium confertum*.

The Gill itself included: *Calypogeia arguta*, *Lophozia ventricosa*, *Nardia scalaris*, *Pogonatum aloides*, *Dicranella schreberana*, *Dicranum tauricum*, *Pottia truncata*, *Pohlia wahlenbergii*, and *Hyocomium armoricum*.

LAVER BANKS

Marchantia polymorpha, *Plagiochila asplenioides* (vars *asplenioides* and *major*), *Dicranum tauricum*, *Fissidens viridulus* var *viridulus*, *Bryum rubens*, *Hookeria lucens*, *Fontinalis squamosa*, *Hygrohypnum ochraceum*, *Brachythecium plumosum*. The only specimen of *Schistidium apocarpum* was recorded by myself on the coping of a bridge.

Mr Blockeel recorded the following species from a tree trunk by the Ure at Bridge Hewick: *Tortula latifolia, T subulata, Orthotrichum affine, O sprucei, O diaphanum*, and *Leskea polycarpa, Orthotrichum sprucei* has been very sparsely recorded in the past, but Mr Blockeel is finding it in an increasing number of places.

The following list includes the rest of the species found at the two main sites. The nomenclature for hepatics follows *Census Catalogue of British Hepatics* (4th edition) by J A Paton and the nomenclature for mosses is from *The Moss Flora of Britain and Ireland* by A J E Smith.

	Picking Gill	Laver Banks
HEPATICAE		
Conocephalum conicum		X
Pellia epiphylla		X
P endiviifolia	X	X
Lepidozia reptans	X	X
Calypogeia muellerana	X	
Barbilophozia attenuata	X	
B floerkei	X	
Lophocolea bidentata	X	
L cuspidata	X	X
L heterophylla		X
Cephalozia bicuspidata	X	X
Diplophyllum albicans		X
Scapania undulata	X	X
MUSCI		
Tetraphis pellucida	X	
Polytrichum piliferum	X	
P commune	X	
P formosum	X	
P juniperinum	X	
Atrichum undulatum	X	X
Ceratodon purpureus	X	
Dichodontium pellucidum		X
Dicranella varia	X	X
D heteromalla	X	
Dicranoweisia cirrata	X	X
Dicranum scoparium	X	X
Campylopus paradoxus	X	
Fissidens bryoides	X	
F taxifolius		X
Tortula muralis	X	
Barbula unguiculata	X	
Racomitrium aciculare		X
Funaria hygrometrica	X	
Orthodontium lineare	X	
Pohlia nutans	X	
Bryum pseudotriquetrum		X
B argenteum	X	
B capillare	X	
Mnium hornum	X	X
Rhizomnium punctatum	X	X
Plagiomnium undulatum	X	X
P rostratum	X	
Aulacomnium androgynum	X	
Philonotis fontana	X	
Thamnobryum alopecurum		X
Thuidium tamariscinum	X	X
Cratoneuron filicinum	X	X
Calliergon cuspidatum	X	X
Brachythecium rutabulum	X	
Pseudoscleropodium purum	X	
Rhynchostegium riparioides		X
Eurhynchium striatum		X
E praelongum	X	X
Plagiothecium denticulatum	X	X
P undulatum	X	
Isopterygium elegans	X	X
Hypnum cupressiforme var *cupressiforme*	X	
Rhytidiadelphus squarrosus	X	X

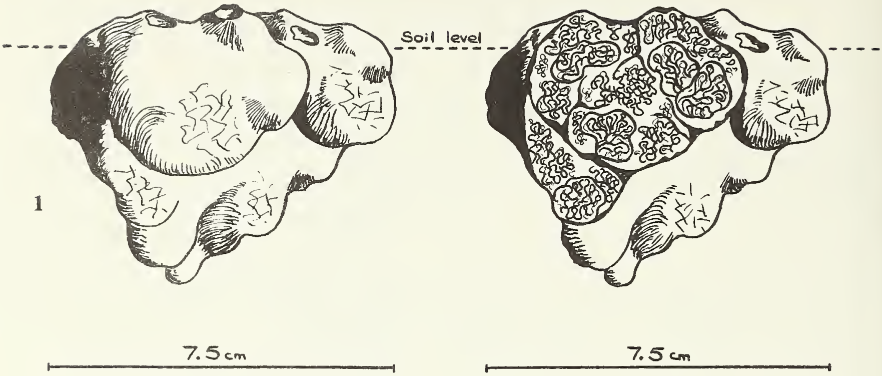
CHOIROMYCES MEANDRIFORMIS Vitt. — WHITE TRUFFLES — IN YORKSHIRE, V.C. 64

K. REDSHAW, K. M. BIRKBY and T. F. PREECE

Agriculture Building, University of Leeds, Leeds LS2 9JT

Following the finding of *Tuber aestivum* Vitt. in Leeds (Preece and Redshaw, 1978) two specimens of what the finder suggested were 'white truffles' were sent to one of us (K.R.) in August 1978 from a site near Harrogate in Watsonian Vice-County M.W. 64. It was requested that the exact location of the find should not be disclosed. Both specimens were fresh but much damaged, obviously by slugs. Large and irregularly oval-shaped, they had a whitish-brown fleshy interior of marbled appearance and had a smooth, but in places finely cracked, whitish skin (Fig. 1). Microscopical preparations showed eight ascospores in each more or less ellipsoidal ascus (Fig. 2). The ascospores were circular, about 18μm in diameter, yellowish, and covered with blunt-ended projections about 4μm long (Fig. 3). Reference to Hawker (1954) confirmed the identification, though our specimens differ from the ones she describes in that ours were quite mature, though gathered in August. We were invited by the owner to visit the site of the find and there found eight further specimens, three

1



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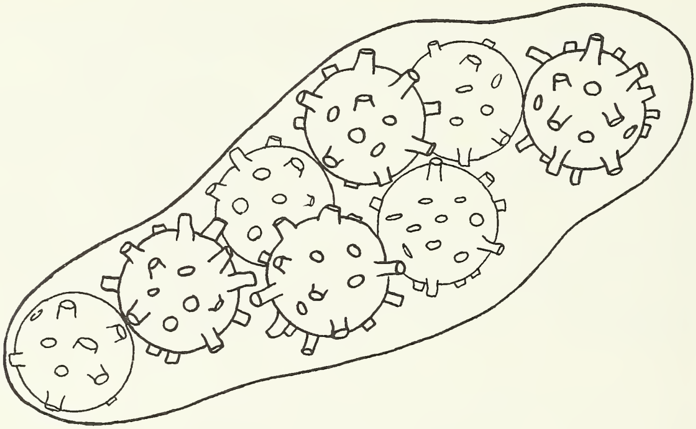

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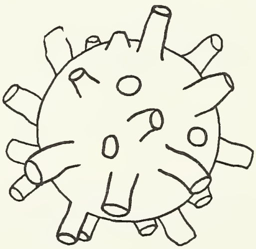

Figure 1 Drawings of one of the specimens of *C. meandriformis* found near Harrogate.
Left: entire.
Right: cut across showing the marbled appearance of the interior.

Figure 2 A single ascus from the fruiting body shown in Fig. 1 containing eight ascospores.

Figure 3 A single ascospore of 18μm diameter showing the numerous blunt-ended projections of 4μm length.

growing in a closely-mown roadside grass verge and the others in the grassed corner of the finder's adjacent private garden (Fig. 4). All the specimens were found growing within 5 m of the bases of two lime trees *(Tilia × europea)* and were within 2m of a privet hedge *(Ligustrum vulgare).* Three sycamore saplings *(Acer pseudoplatanus)* and one apple tree *(Malus* sp.*)* were growing in the vicinity of the specimens in the garden. The whitish-brown, but in some cases slug-eaten, truffles were easily visible, like stones in the grass, having emerged above soil level. Ramsbottom's description and fine illustration of the fungus being usually 'half buried' in grass was particularly apt at this site. Three of these were removed from the ground along with a soil sample. One specimen had a typical strong, ripe, truffle aroma and nutty flavour when tasted. The largest proved to have a weight of 468 g and a diameter of 11.0 cm at its widest point. Testing the soil, which was a rich fibrous loam, showed it to have a pH of 6.6. Apart from periodic mowing, the site (which has an open aspect and appears to be well drained) is believed to have been undisturbed for over thirty years, and the owner of the site had no recollection of having seen them in previous years. He

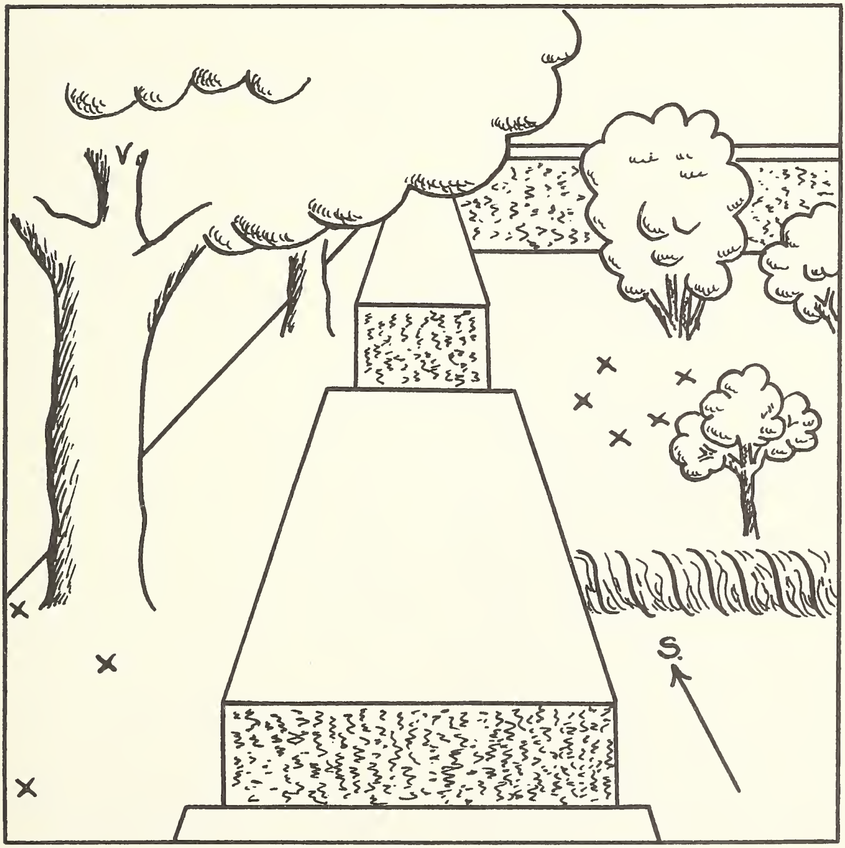

Figure 4 Details of the site at which specimens of *C. meandriformis* were found. To the left of the privet hedge are two mature lime trees and to the right are younger trees of privet, sycamore and apple. The X's show the location of fruiting bodies.

did, however, remember eating 'white truffles' as a small boy, collected in the Stokesley area of North Yorkshire.

One of the *C. meandriformis* specimens was sent by us to Mr W. G. Bramley, who commented that this is a very uncommon fungus in Yorkshire. He had previously seen a specimen in September 1966 from Fadmoor, Kirkbymoorside, which was found in peaty soil under rhododendrons and was only seen when a retaining wall collapsed and was being rebuilt. The identity of this Kirkbymoorside specimen was confirmed as *C. meandriformis* at Kew. There is a record of the presence of the fungus in V.C. 62 in Mason and Grainger (1937) but details of this are unknown and the site uncertain. Mr Bramley emphasised that the reason there are no records is that no-one looks for truffles in Yorkshire.

The white truffle is edible (according to Ramsbottom, 1953), is sold in Upper Silesia as 'Kaiserpilz', and is used in France to adulterate *Tuber* truffles. Ramsbottom also points out that bear cubs are used for hunting out *Choiromyces* fruiting bodies near the convent of Sergievsky in Russia!

Nothing is known of how this fungus develops (Hawker, 1954) and clearly there is much more to be discovered about all aspects of the distribution and biology of hypogean fungi in Yorkshire.

Acknowledgements

Whilst respecting her wish to remain anonymous, we would nevertheless, like to thank the finder of these *C. meandriformis* specimens for bringing them to our notice, and permitting access to her garden.

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BOOK REVIEW

Collins Handguide to the Birds of Britain and Europe by **Martin Woodcock**, and illustrated by **Hermann Heinzel**. pp 96. Collins, 1978. £1.95

Although ostensibly an identification guide to all the commonest and most conspicuous birds of the British Isles and Western Europe', it is nevertheless obviously geared to the British reader. It is surprising therefore (especially when it claims that 'the reader will not be confused by the inclusion of large numbers of rare species') to find that species like Crested Lark, Serin and Golden Eagle are included whilst Whooper Swan, Wigeon, Eider, and Sand Martin are not. Little and Black Terns are apparently counted amongst our 'commonest and most conspicuous birds' but the Arctic Tern does not qualify. Likewise Kentish Plover is in; Golden Plover excluded.

One hundred and twenty-two species are described and illustrated. They are shown in different plumages and postures, and an attempt has been made to suggest the type of habitat in which one would find them. Some of the illustrations are scarcely satisfactory, Little Grebe and Gannet for instance being definitely mis-shapen.

With good field and pocket guides already available at reasonable cost (and the House of Collins has not been noticeably absent from this market) it is difficult to see how this present volume can be justified even for the beginner or the junior end of the market. I happen to believe that the young deserve nothing but the best. I would advise the young enthusiast to save his £1.95 and add to it until he can afford one of the better, more comprehensive guides.

RFD

SEMERWATER: TWENTY YEARS LATER

R. M. CRASKE, E. FISHBURN, B. A. HODGSON, AND E. M. MOORE

In 1978 a general study was made of the four main types of terrestrial vegetation at Semerwater and the results are compared with those of a similar survey carried out by members of the Botany School, Cambridge, in June 1958 (*Naturalist*, no. 871: 113–27). The four vegetation types considered are: (a) Fringing woodland; (b) *Salix* carr; (c) *Carex* marsh; (d) *Phragmites* marsh. Since 1958 there have been various drainage operations in several places.

The frequency abbreviations used below (A — abundant, LA — locally abundant, F — frequent, LF — locally frequent, O — occasional, R — rare) are those adopted for the 1958 survey. Where the 1958 frequency appears to have differed from that observed in 1978, the former is shown in parentheses. Where there is no record for 1958, the 1978 record is asterisked.

(a) FRINGING WOODLAND

Acer pseudoplatanus	F (O)
*Aesculus hippocastanum**	R
Alnus glutinosa	F
*Betula pubescens**	R
*Crataegus monogyna**	R
Fagus sylvatica	O
Fraxinus excelsior	F
*Ilex aquifolium**	R
*Larix decidua**	R
*Prunus padus**	R
Quercus petraea	O
Rosa sp.*	R
Ulmus sp.*	R

Herb layer

Filipendula ulmaria and *Urtica dioica* are dominant. The occasional patches of nettle noted in 1958 have obviously spread considerably. The number of species of flowering plants shows a marked increase over those recorded in 1958.

*Achillea ptarmica**	R
*Alchemilla glabra**	R
*Alliaria petiolata**	R
*Allium ursinum**	O
*Anemone nemorosa**	O
*Angelica sylvestris**	O
*Anthriscus sylvestris**	R
Arrhenatherum elatius	F
*Bellis perennis**	R
*Campanula latifolia**	O
*Cardamine amara**	O
(One patch of *C. amara* was quite spectacular with double flowers and 'hen and chickens'.)	
*'Cerastium vulgatum'**	R
*Chrysosplenium alternifolium**	O
*Chrysosplenium oppositifolium**	O
Conopodium majus	F
Crepis paludosa	O
*Dactylis glomerata**	R
*Deschampsia caespitosa**	R
Equisetum sp.* (young)	O
*Galium aparine**	R
*Galium cruciata**	R
*Galium palustre**	O
Geranium sylvaticum	F
Geum rivale	O (R)
*Heracleum sphondylium**	R
*Iris pseudacorus** (in lower parts of wood)	LF
*Lysimachia nemorum**	R
*Mentha aquatica** (in lower parts of wood)	LF
*Mercurialis perennis**	R
*Myrrhis odorata**	R
*Petasites hybridus**	R
*Phragmites communis** (in lower parts of wood)	LF
*Ranunculus auricomus**	O
Ranunculus ficaria	A (F)
*Rumex crispus**	O
Taraxacum sp.*	R
Trollius europaeus	O
*Veronica beccabunga**	R
*Veronica chamaedrys**	R
*Viola riviniana**	R

(b) *SALIX* CARR

There still appear to be several species and hybrids of *Salix*. In the herb layer *Filipendula ulmaria* remains co-dominant with either *Phalaris arundinacea* or *Phragmites communis*, also

Caltha palustris	O	*Myosotis caespitosa*	O
Cardamine amara	F (O)	*Rumex acetosa**	F
Crepis paludosa	LF	*Rumex crispus*	O
Equisetum sp.* (young)	F	*Solanum dulcamara**	R
Galium palustre	A	*Urtica dioica*	LF
*Mentha aquatica**	O	*Valeriana dioica*	F

(c) *CAREX* MARSH

(Only the area to the west of Crooks Beck was investigated in 1978)

Carex rostrata and *Carex vesicaria* are still both dominant over large areas, with *C. vesicaria* possibly more abundant. *Eleocharis palustris* appears to be less plentiful now than it was in 1958, and a species of *Callitriche* is locally abundant, which might mean that the *Carex* marsh is wetter now. *Caltha palustris* and *Myosotis caespitosa* still appear to be widespread over the whole area. Other species present are

Agrostis stolonifera	F	*Lynchnis flos-cuculi*	R (O)
*Alisma plantago-aquatica**	O	*Mentha aquatica*	F
Cardamine amara	O	*Poa pratensis*	R
Cardamine pratense	F (O)	*Potentilla anserina*	F (R)
Carex nigra	O	*Ranunculus flammula*	R
Cerastium vulgatum	R	*Ranunculus repens*	F (O)
Crepis paludosa	O	*Rumex acetosa*	R
Equisetum sp. (young)	R	*Rumex crispus**	O
Filipendula ulmaria	R	*Senecio aquaticus*	F (R)
Galium palustre	F	*Trifolium repens*	R
Glyceria fluitans	O		

(d) *PHRAGMITES* REEDSWAMP

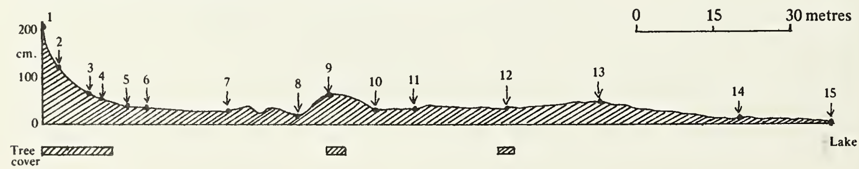
Phragmites maintains its dominance throughout and there is still a belt of *Filipendula ulmaria*. *Caltha palustris* continues to be very abundant. Other species recorded are

Agrostis stolonifera	O	*Galium palustre*	F
Cardamine amara	F	*Mentha aquatica*	F (O)
Carex acuta	O	*Myosotis caespitosa*	A
Carex acutiformis	O	*Phalaris arundinacea*	F
Carex rostrata	F	*Poa* sp.	O
Carex vesicaria	O	*Valeriana dioica*	LF
Equisetum sp. (young)	F		

The transects

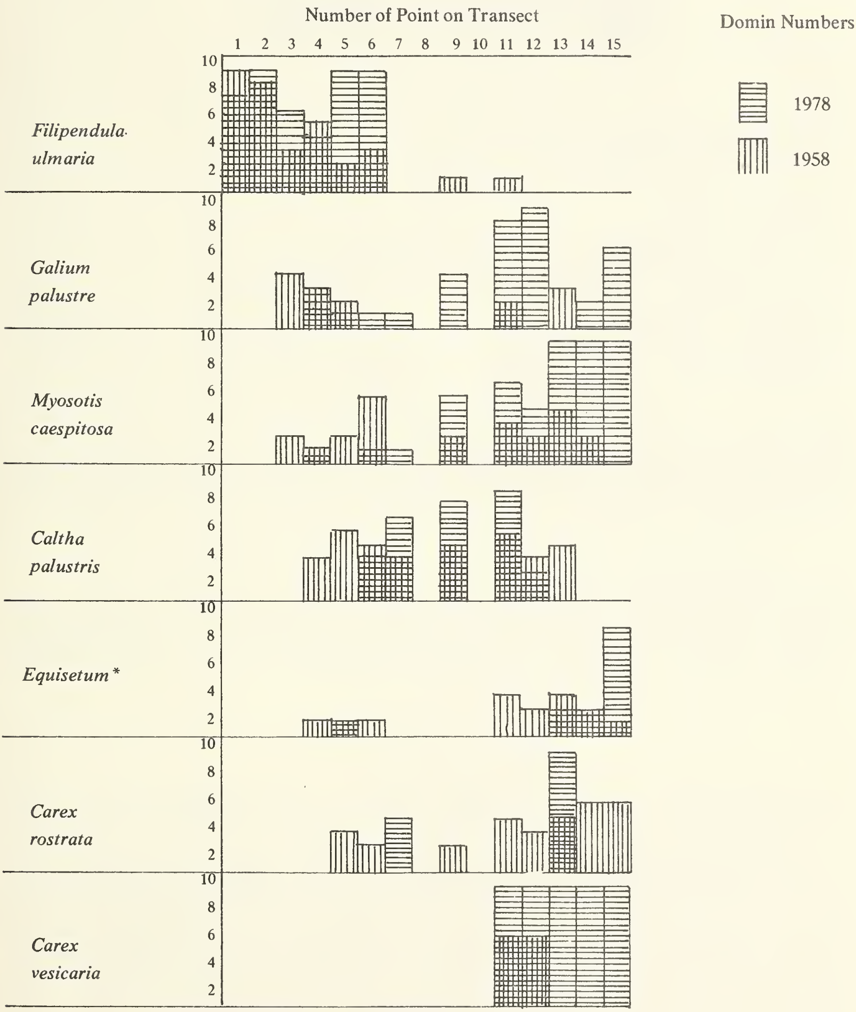
An attempt was made to investigate some parts of the 1958 transects A and C. Transect A was relocated satisfactorily, but the location of transect C proved dubious. As in 1958, quadrats of one-metre square were put down and the cover and abundance of species was recorded using the Domin scale.

PROFILE OF TRANSECT A (*vide Naturalist*, no. 871)

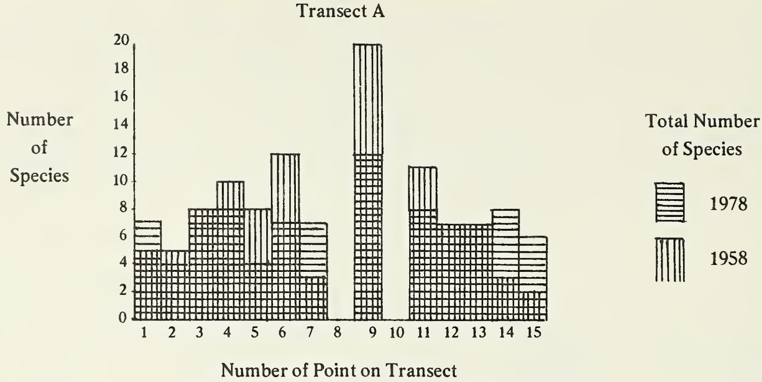


In 1978 there is no tree cover at points 9 and 12, and all that remains of former trees is some very spongy, prostrate stump material. There is less evidence of the buried sandbank (points 8, 9, 10) which in 1958 coincided with a sudden increase in total number of species in quadrat A9. In fact, it was so difficult to decide the limits of this sandbank that points A8 and A10 could not be located and there are no 1978 records for these points. In A15 safety prevented the closest of inspections, but *Carex vesicaria* appeared to be growing out into the water. It could be that, after a very wet winter and spring, there was more water round the head of the lake than is usual at this time of the year.

Domin Numbers of Selected Species



* *Equisetum* was just beginning to appear in 1978, so there might be more later in the year.



Species recorded in 1958, but not recorded in 1978

(a) FRINGING WOODLAND

Cirsium arvense	R	*Ranunculus acris*	R

(b) *SALIX* CARR

Arrhenatherum elatius	R	*Eleocharis palustris*	R

(c) *CAREX* MARSH (WEST OF CROOKS BECK ONLY)

Achillea ptarmica	R	*Potentilla palustris*	R
Deschampsia caespitosa	R	*Taraxacum* sp.	R
Menyanthes trifoliata	R	*Trifolium pratense*	R
Orchis purpurella	O	*Valeriana dioica*	R
Poa annua	R		

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Acknowledgements

Our thanks are due to Mr P. Clay for his permission for a 1978 vegetational survey, and also to the Professor of Botany, University of Cambridge, and the Professor of Biogeography, The Australian National University, Canberra, for the kindly interest they have shown in this project.

BOOK REVIEW

The Bird Watchers' Guide to the Wetlands of Britain by **M A Ogilvie**. pp 189, Batsford, 1979. £4.50

'. . . here is a handbook which not only locates and describes all the major wetland sites in England, Wales and Scotland but also gives species tables, compiled from the most recent and authoritative surveys, of the numbers and importance of wildfowl and waders to be found at each site.' An introductory section on wetland habitats and methods of counting birds is followed by brief accounts of forty-nine species of waterfowl likely to be encountered. The bulk of the book is made up of county-by-county descriptive catalogues of wetland sites accessible to bird watchers. Written by a Research Officer of the Wildfowl Trust, this is a useful addition to the itinerant bird watcher's bookshelf.

BS

THE *ANDREAEA* OF HEBDEN BRIDGE

T. L. BLOCKEEL

The genus *Andreaea*, small blackish mosses of hard acidic rocks, is now very rare in the southern Pennines of V.C. 63. The only station where the genus has been seen during the present century in the Hebden Valley north of Hebden Bridge. G. A. Shaw and H. Walsh gathered material here on 25th April 1948, but did not notice the moss in the field; subsequently, on 26th September 1948, it was located on a boulder in the river bed at High Greenwood. The record was published as *A. rothii* (Walsh, 1949 and 1957).

With this record in mind, I searched for *Andreaea* in the Hebden Valley in October 1977 and duly found a colony in the river bed at High Greenwood. I assumed this was *A. rothii*, but it eventually became clear that the plant was closer to *A. crassinervia*. This identification has been confirmed by Mr M. O. Hill. Since then, through the kindness of Mr Shaw, I have been able to examine the 1948 gatherings, and these too are *A. crassinervia* and evidently from the same locality. The station may in fact be traced back to the mid-nineteenth century: in 1864, G. E. Hunt (in Braithw ite, 1880; cf. Lees, 1877) recorded *A. crassinervia* from Hebden Bridge, and it is highly probable that his station is the same as the present one.

A. crassinervia occurs on at least three boulders in the river bed at High Greenwood at an altitude of *c.* 200 metres. The patches are close to the water level and must experience occasional inundation. It may be this fact, together with the highly sheltered nature of the locality at the foot of a deep, wooded gorge, that explains the survival of the station. The growth here appears perfectly healthy and capsules were observed when one patch was examined in May 1978.

The occurrence of *Andreaea* in V.C. 63 may be summarised as follows. It should be noted that not all bryologists accept *A. crassinervia* as a distinct species, some considering it a subspecies, variety or even form of *A. rothii*.

A. rupestris Hedw. Rocks on Stansfield Moor (34/92), 1837, Herb. Leyland (Crossland, 1904), and S. Gibson (Baines, 1840); bottom of Hudson Moor, Harely Wood (34/92), nearly extinct, T. Stansfield (Lees, 1888); Greenfield (44/00), R. Buxton (Whitehead, 1886).

A. rothii Web. and Mohr. Rocks, Stansfield Moor (34/92), 1837, Herb. Leyland (Crossland, 1904); Hudson and Staups Clough (34/92), A. Stansfield (Lees, 1888); Hebden Valley rocks (?34/93), A. Stansfield (Lees, 1888) — this could be *A. crassinervia*.

A. crassinervia Bruch. The Hebden Bridge records (34/93) described above are the only ones traced.

Both *A. rupestris* and *A. rothii* appear to be extinct in V.C. 63. The herbarium of Roberts Leyland, with vouchers of both species, is now lost.

I wish to thank Mr G. A. Shaw for allowing me to examine his packets of *A. crassinervia*.

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FIELD NOTES

The distribution of *Orthothecium rufescens* (Brid) B, S & G in the North of England

The moss, *Orthothecium rufescens*, whilst fairly widespread in Scotland and with one or two localities in VC 49, has only been recorded from the four vice-counties 62, 64, 65, and 69 in England:

VC 62

The only record is that of W Mudd from Sleddale, Cleveland, 1852. (*BBS Trans*, vol 4, part 4).

VC 64

(1) Malham Moor. First record John Nowell, *ante* 1854: 'Marshy ground on Malham Moor' (given in *Supplement* to Baines's *Flora* of 1854). This doubtless refers to the site on the wet silurian rocks where the Settle-Grassington track crosses Gordale Beck. Still there.
Miall and Carrington's *Flora* of 1862 has the following: 'between Malham and Kilnsey Crag, L. C. Miall'. In *Naturalist*, no 42, 15 Jan 1866, this record is expanded to read: 'between Kilnsey and Malham, about half a mile past the edge of the moor, in fruit'. This is somewhat vague, but if the 'Moor' is taken to be Malham Moor, then the first-mentioned site of Nowell's is about half a mile from the open moor of Malham Lings at Street Gate. In my opinion, Miall's and Nowell's sites are one and the same.
(2) Heselden Ghyll. First record Wood 1868 (Braithwaite's *Moss Flora*). Still there.
(3) Cowside Beck, Arncliffe. First record: William West 1879. Seen by GAS in 1948.
(4) Park Ghyll, Buckden 1907, C A Cheetham. Still there.
(5) Wet cliff on the left of the Moor End path, about half a mile above the river bridge, Kettlewell, GAS 1964.

The following should also be noted:
(a) Seen by GAS in 1948 nr Scabbate Gate Wood, on the Park Rash road, Kettlewell. Could not be found in 1969.
(b) Penyghent. Lees' *Flora* of 1888 gives Penyghent, and *BBS Rep* **III**, 1937 gives 'Penyghent 1935, C.A.C. & F.E.M.' It is perhaps a little doubtful whether these refer to the mountain Penyghent proper or to the site at the head of Heselden Ghyll. It is significant that *Naturalist* 1936 says 'Confirmed Heselden Ghyll'. A site on Penyghent proper is not known.
(c) Silverdale (Lees' *Flora*, 1888). This site not now known, if indeed it does not refer to the Heselden Ghyll site.
(d) Ingleborough. *BBS Rep*, **II**, 209 gives: 'Ingleborough, Aug. 1934, W.Y.' The BBS Librarian says this would be a record of the late Mr Wm Young, JP, of Kirkcaldy, Fife. This site is not known now and there is no specimen in Wm Young's herbarium at the University of St Andrews.

VC 65

There are only two known localities in this vice-county:
(1) Near Sedbergh, Binstead 1886 (*Naturalist*, 1897, 262). This is probably the same site as that recorded by the late Albert Wilson in 1922 'on dripping rocks of basal conglomerate by the Rawthey nr. Sedbergh'. Seen here (a short distance upstream from the Strait Bridge, west bank) by GAS in 1961.
(2) Kisdon Force, Keld, T H B Bedford. Precise date of first record not known, but prior to 1937, when it was recorded by Milsom (*Naturalist*, 1937).

VC 69

Five or possibly six sites.
(1) Deep Gill, Wild Boar Fell, G Stabler, 1888.
(2) Tailbridge ravine 1935, A Wilson *(Flora of Westmorland).*

(3) Ais Gill, A Wilson *(Flora of Westmorland).* Still there.
(4) Glen of the Eden, nr Ais Gill (= Hellgill Force), A Wilson *(Flora of Westmorland).* Seen by GAS 1964 and 1976.
(5) Hell Gill, T H B Bedford, *c* 1940.
(6) Near Kirkby Stephen, *Naturalist*, 1913, T W Woodhead. This may refer to one of the sites mentioned above.

O rufescens is practically unknown in a fruiting condition, and the reason for this is the separation of the sexes as has been demonstrated by Bedford (*Naturalist*, 1963, 106). It is to be noted, however, that Miall claimed to have seen it fruiting on Malham Moor.

The above represents the moss's distribution so far as is known to me, but I shall be pleased to receive any further information which other bryologists may have.

G A Shaw

A new bat for Yorkshire

A large dead bat was picked up at Fenton Wood, Greasbrough, Rotherham by C. Rich on 26 July 1977. It was taken to a local taxidermist and later mounted for Clifton Park Museum, Rotherham. At the museum it was tentatively identified as a serotine bat (*Eptesicus serotinus* (Schreber)) and this was later confirmed by Colin Howes, the Y.N.U. mammal recorder and by Dr Bob Stebbings of Monks Wood Experimental Station.

The serotine is a large, dark brown bat with wider wings than the noctule and is distinguished in the hand by its longer ears with a bluntly pointed tragus and the end of the tail being free of the interfemoral membrane. It prefers lightly wooded country and usually rests in tree holes. Its known distribution in Britain is south of a line connecting the Severn Estuary and the Wash, and the most northerly record was from Monks Wood in Huntingdonshire. The specimen from Fenton Wood is, therefore, over 100 km north of the next recorded site as well as being an addition to the fauna of Yorkshire.

Bill Ely
Keeper of Natural History, Clifton Park Museum, Rotherham

Bryological meeting in the Derwent Valley

In April 1968 the YNU Bryological Section visited Kirkham Abbey in the Derwent Valley (VC 61) and enjoyed 'one of the best meetings we have known in the East Riding' (Branson, 1968). For its spring meeting on 21 April 1979, the section therefore decided to look at further sites in this attractive valley. A quick visit was also made to the chalk slopes of Waterdale near the village of Thixendale, and one member stopped *en route* to the meeting for a brief exploration of the Ouse banks south of York. Only three members attended the meeting — unfortunately, since all the locations visited were interesting, and fifty-five species were observed during the day, a respectable total for VC 61.

Howsham Hall and Derwent Banks (44/76). A marshy field with stands of *Glyceria maxima* attracted attention but proved unexpectedly barren of bryophytes except for conspicuous patches of *Physcomitrium pyriforme* with abundant capsules, and a little *Bryum gemmiferum*. More interesting were the river banks near the weir and ruined mill. The sand-covered ground, thick with *Allium ursinum* and a large patch of *Eranthis hyemalis* with other established aliens, had few mosses to offer, but there was adequate compensation on stonework near the mill: *Tortula marginata* was new to VC 61, and *Gyroweisia tenuis* the third record for the vice-county. *Barbula cylindrica* and *Fissidens pusillus* (sensu Bruggeman-Nannenga) were on stonework by the weir.

Swallowpits Beck near Scrayingham (44/76). A nice piece of rough ground, with marsh and scrubby banks, was found just outside the village. The banks of the beck had *Pellia endiviifolia*, *Pohlia carnea* and *Leskea polycarpa*, and on concrete *Tortula latifolia* and *Orthotrichum diaphanum*. The *Tortula* was interesting for the vast quantities of gemmae smothering the surfaces of the leaves. *Physcomitrium pyriforme* was seen again, and Mr Grant emerged from the scrub with *Plagiochila asplenioides* var *major* and *Hylocomium splendens.*

Waterdale (44/86). The chalk slopes had the characteristic species, but no real surprises: *Dicranum bonjeanii*, *Fissidens adianthoides*, *Weissia microstoma*, *Ctenidium molluscum*, *Rhytiadelphus triquetrus*, and *Hylocomium splendens* were the most noteworthy. A bank of elders near the head of the dale, though coated with bryophytes, proved a little disappointing on close investigation, having few species other than *Dicranoweisia cirrata*, *Orthodontium lineare*, *Aulacomnium androgynum*, and *Lophocolea heterophylla*.

Ouse Banks (44/64). Tree roots had abundant *Tortula latifolia*, *Barbula cylindrica* and *Leskea polycarpa*. The track to the river passed an arable field with *Dicranella staphylina* and *D schreberana*, but was interesting in its own right for the associations of small soil-growing mosses. *Bryum gemmiferum* was intermixed with *B bicolor*, the lighter and yellower colour distinguishing the former even macroscopically. *Barbula hornscuchiana* and *Pohlia wahlenbergii* were also present, but it was surprising to find among them a few stems of a *Philonotis*, unfortunately too immature for specific determination.

Nomenclature of mosses follows Smith (1978) and of hepatics Paton (1965).

I wish to thank Mr E Thompson and Mr D Grant for their help at the meeting.

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T L Blockeel

Azolla filiculoides Lam. **and its weevil,** *Stenopelmus rufinasus* Gyll., **in Yorkshire**

In 1977 my wife noticed that a large pond beside the Selby-Howden road (A63) in the parish of Hemingbrough, near the bridge over the River Derwent, was completely covered by a floating carpet of the duckweed *Lemna minor* L. and the tiny water fern *Azolla filiculoides* Lam. The plants were in nearly equal proportions. Later, reading through back numbers of an entomological journal, I noted that a small but distinctive weevil, *Stenopelmus rufinasus* Gyll. had been discovered for the first time in Britain in the Norfolk Fens on *Azolla* in 1921 (Jansen, O. E., 1921, *Ent. mon. Mag.* 57: 225–6). Subsequent records indicated that the weevil, like the *Azolla* an introduction from North America, could be common in the south of England wherever the fern was established. On 9 September 1978, we revisited the pond and found that the cover of both *Lemna* and *Azolla* was much reduced but a search produced a fine series of *Stenopelmus*.

The weevil is very small, less than 2 mm long, inconspicuous and very slow moving, stationary when disturbed, and its hydrofuge covering enables it to creep about the vegetation under the water. It moves easily on the surface film. A careful, patient search is necessary for its discovery.

The most northerly record for *Azolla* in Perring, F. H. and Walters, S. M., *Atlas of the British Flora* (1962) is in the south of Lincolnshire (10 km square TF13). In 1972 Dr Walters found it in the village pond at Wigginton (Medd, T. F., in 1973, *Y.N.U. 111th Ann. Rep.*: 29), apparently for the first time in Yorkshire. Since then the pond has been cleaned out, hybrid ducks introduced and there is now no trace of *Azolla* or indeed scarcely any other aquatic plant. No other records appear to have been published in the *Naturalist* and Miss F. E. Crackles tells me that it has not previously been reported in V.C. 61.

This occurrence of *Stenopelmus* in an apparently isolated station of *Azolla* seems to indicate the probability that weevil and fern were introduced together to the pond. It was interesting to note at the same time a numerous population of the tiny water boatman *Plea atomaria* Pall., generally a southern bug but previously noted in Yorkshire at Market Weighton prior to 1921 and at Kilnsea in 1951.

J. H. Flint

BRACKISH-WATER ROTIFERS FROM THE MICKLETOWN LAGOONS IN THE LOWER AIRE VALLEY

A RUTTNER-KOLISKO

Biological Station, Lunz, Austria

During a stay at the Windermere Laboratory of the Freshwater Biological Association I had the opportunity to examine preserved samples collected by Dr G Fryer from Mickletown Flash and the adjacent lagoons affected by colliery dumpings and rich in soluble mineral salts. The history of these brackish-water lagoons is described in detail by Brook (1976) and summarized by Fryer (1978) who presents information on the chemical composition of their waters.

Being interested in rotifers, a group of the animal kingdom living almost exclusively in freshwater and also in inland salt waters with an ionic composition different from diluted sea water, my intention was to look for those few rotifer species which are characteristic of inland saline waters (Ruttner-Kolisko, 1971) and to see whether the remarkable brackish-water element of the crustacean fauna had a parallel among the rotifers.

It was not easy to find rotifers in the samples at my disposal which were taken from the shore for the purpose of collecting crustaceans and contained mainly macrozoobenthos and detritus. Nevertheless a few rotifer species have been detected, although these are probably far from being representative of the total rotifer fauna of the Mickletown system. Four species with an affinity for waters of high salinity were encountered:

Brachionus plicatilis Müller, a true salt water dweller, was found in samples from Boat Lane Ing. This species is known to survive in alkaline salt water as well as diluted sea water of all concentrations, but usually thrives only in lakes with a salt content of >10,000 mg/l. Boat Lane Ing, the least saline of the Mickletown lagoons, is therefore a rather dilute water in which to find this species. In some highly concentrated salt lakes it constitutes the principal part of the zooplankton.

Colurella adriatica Ehrenberg, a littoral salt water species, also occurred in Boat Lane Ing. It has been described from brine lagoons of the Adriatic, and has been found in salt springs in Germany, and in salt water pools of the Iranian Salt Desert (unpublished data), among many other sites.

Testudinella patina (Hermann), which was found in samples from Mickletown Flash, usually lives among macrophytes of the littoral zone but also occurs in the plankton of fresh and slightly salty water bodies of small size. It is a ubiquitous rather than a salt water species.

The same distribution pattern applies to *Cephalodella catellina* (Müller) which occurred in samples from Boat Lane Ing. This species can be found everywhere in the benthos of standing or running fresh or slightly salty water.

There were several bdelloid rotifers in some of the samples which could not be identified in the preserved condition and this was also the case with a *Notommata* sp found in The Whinny.

Summarizing, it can be said that this brief glimpse of the rotifers of the Mickletown flashes of the Lower Aire Valley indicates a species composition which would render worthwhile a thorough investigation of this interesting inland saline water system.

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ON THE OCCURRENCE OF *DIAPTOMUS CASTOR* (JURINE) (CRUSTACEA CALANOIDA) IN THE NORTH OF SCOTLAND

ALAN E JOYCE

Records of the freshwater calanoid copepod *Diaptomus castor* (Jurine) in Scotland mostly date from the turn of the century and refer to central and north-eastern areas. Its occurrence in the north of the mainland is reported for the first time.

The habitat of *Diaptomus castor* has been described by Gurney (1931–33) as ditches and small pools. Sars (1901–03) states it as small pools of shallow dimensions. Dussart (1967) also describes the habitat as small or temporary pools, clear or rich in organic matter. The geographical distribution given by Dussart (1967) is Europe, avoiding the extremes of north or south. Sars (1901–03) mentions only southern Norway and Sweden. The exception to this is the record for Greenland (Gurney 1931–33). Within its European range, *D castor* is regarded as a winter or spring species.

The British distribution of *Diaptomus castor* (Jurine) is given by Gurney (1931–33) as 'widely distributed, not uncommon in the East and South of England'. Harding and Smith (1960) state that it is 'characteristic of the winter months and of pools which are dry in summer'. The few Scottish records are listed by Gurney (1931–33) as: Unst in Shetland, a pool near Aberdeen, a quarry near Glasgow and Braid pond near Edinburgh; in addition, Fryer (1978) cites a pool near Loch Lomond.

In the past twelve years the author has sampled over 400 sites in an area including Inverness-shire, Ross-shire, Sutherland, Caithness, Orkney, Shetland, Lewis, and Iceland. With the exception of Iceland, in these areas *Diaptomus laciniatus* Lilljeborg, *D gracilis* Sars, *D laticeps* Sars, and *D wierzejskii* Richard are widely distributed. In Iceland, only *D minutus* Lilljeborg and *D glacialis* Lilljeborg occur. *Diaptomus castor* has been identified from only six sites. These were confined to a small area some eight miles in length in the lower part of Strathnaver in Sutherland, and ranged from a small pool thirty feet in diameter to an extensive marsh. All were dry from late May till mid-September in 1978. There is no reason to believe that this is not typical of most seasons. Adult *D castor* were found in these pools when samples were taken in October, November, February, and April.

The February sample was taken through a hole cut through a six-week-old ice cover. One pool was empty on 11/9, full on 12/9. Nauplii were obtained when the pool was sampled on 16/9. Stage V copepodites were present in a sample taken on 30/9. Adults with eggs were present in a sample taken on 28/10. None of the permanent lochs in the surrounding area so far sampled has been found to contain *D castor*.

The question arises as to whether *D castor* has been introduced into this area at some time in the past hundred years along with live bait used in the sporting fishings, or whether it is a relic from the post-glacial fauna. Its occurrence beneath a six-week-old ice cover suggests that more winter sampling of temporary pools, even if frozen, may increase our knowledge of the distribution of this copepod in northern Scotland.

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YORKSHIRE NATURALISTS' UNION EXCURSIONS IN 1978

Edited by R. CROSSLEY

Broomfleet and Faxfleet (V.C. 61) (3rd June)
Broomfleet lies in the southern portion of a once huge expanse of marsh and swamp known as Walling Fen. Extensive drainage in the 18th and 19th centuries gradually changed this but as recently as twenty years ago there were several wet pastures dotted here and there. However, recent intensive farming has left only isolated pockets of the former fen, chiefly alongside the Hull-Selby railway line. In the morning members visited one of these, Oxmardike Marr, just to the north of the line. The afternoon was spent on the shore of the Humber between the western extremity of Broomfleet Island, the reclamation of which was completed by 1908, and the Faxfleet Pond, just west of the village of that name. This pond was created in recent years by the Yorkshire Water Authority when clay was excavated from the site in order to strengthen the Humber Bank. Just east of the Market Weighton Canal there is another smaller pond, of similar origin to the Faxfleet Pond. Here in 1967 Roman remains were excavated, including a pig of Derbyshire lead dated *c.* A.D. 150.

Ornithology (B. S. Pashby)
In the morning Oxmardike Marr was visited and here Lapwing and Yellow Wagtail, both with fledged young, were feeding by an extensive pool. A pair of Whinchats occupied a dry part of the area through which ran a drain, where a pair of Coots had a brood of young. On the nearby Market Weighton Canal a female Mallard with eight young and a Shelduck with young were seen. Other species obviously breeding here were Moorhen, Sedge Warbler, Whitethroat, Meadow Pipit, Chaffinch and Yellowhammer. A Curlew was heard 'bubbling' and a Cuckoo was calling constantly.

Later, along our route to Weighton Lock on the Humber shore, Kestrel, Common and Red-legged Partridge, Turtle Dove, Magpie, and Corn Bunting were seen. Just east of the lock, on a small pond, a second pair of Coots was seen and in the reed beds at the western end of the Broomfleet Island frontage, our first Reed Warblers. On Whitton Sand three Herons and a party of about forty Shelducks together with a few Lesser Black-backed Gulls were observed. A small party of Oystercatchers and two 'Comic' Terns were flying over the river. Later a fleeting visit was paid to Faxfleet Pond where the Reed Warbler and a third brood of Coots, as well as a family party of Mute Swans and a Meadow Pipit carrying food, were recorded. There was no sign of either Little Grebe or Shoveler which had been present at an earlier date. Altogether a list of forty-five species was recorded.

Arachnology (C. J. Smith)
The hot, dry weather over the previous fortnight had caused most species to retreat to cooler, damper habitats, especially the Linyphiids. Two locations were investigated and the following species were recorded: Higham Lodge (862288), meadow and dried marsh; *Clubiona stagnatilis*, *Xysticus cristatus*, *Araneus cornutus*, *Tetragnatha extensa*, *Oedothorax retusus*, *Pocadicnemis pumila*, *Hypomma bituberculatum*, *Silometopus reussi*, *Savignia frontata*, *Meioneta rurestris*, *Bathyphantes approximatus*, *Leptyphantes tenuis*, *Micropinyphia pusilla*.

Weighton Lock (875256) *Phragmites* beds and brackish dry marsh; *Clubiona reclusa*, *C. phragmitis*, *Pardosa purbeckensis*, *P. amentata*, *Walckenaera unicornis*, *Oedothorax retusus*, *Hypomma bituberculatum*, *Silometopus elegans*, *Diplocephalus permixtus*, *Erigone arctica*, *Bathyphantes approximatus*, *Leptyphantes tenuis*.

Flowering Plants (E. Crackles)
The botanists began their investigations along the road between Oxmardike Crossing and Higham Lodge. *Reseda alba* (White Mignonette) was seen near a farm, *Ornithogalum umbellatum* (Star-of-Bethlehem) by the roadside and *Coronopus squamatus* (Swine-cress) in a field gateway.

In a fallow field in Marr Lane was a very fine show of the large form of *Ranunculus sardous* (Hairy Buttercup). Among other species present were *Geranium dissectum* (Cut-leaved Cranesbill), *Anagallis arvensis* (Scarlet Pimpernel), *Viola arvensis* (Field Pansy), *Myosotis discolor* (Yellow and Blue Forget-me-not), and *Veronica persica* (Buxbaum's Speedwell).

In the adjacent cornfield, which had not been treated with selective weedkillers, the most notable of a number of weeds recorded were *Valeriana locusta* (Common Cornsalad), *Spergula arvensis* (Corn Spurrey), *Aphanes arvensis* (Parsley Piert), *Ranunculus arvensis* (Corn Buttercup), and *Papaver argemone* (Long Prickly-headed Poppy).

The most noteworthy species along the Market Weighton Canal was *Barbarea stricta* (Small-flowered Yellow Rocket) with much *Dipsacus fullonum* (Wild Teasel) also present. *Medicago sativa* (Lucerne) and *Senecio squalidus* (Oxford Ragwort) were recorded, as well as several widespread species.

A newly cut delph and the adjacent marshy area were examined, but this area requires more thorough examination later in the season as some species were too immature for accurate determination. *Carex disticha* (Brown Sedge) was frequent in the marshy area and other species present included *Mentha aquatica* (Water Mint), *Iris pseudacorus* (Yellow Iris), *Angelica sylvestris* (Wild Angelica), *Polygonum hydropiper* (Water-pepper), *Galium palustre* (Common Marsh-bedstraw), *Juncus effusus* (Soft Rush), *Carex hirta* (Hairy Sedge, *Carex riparia* (Greater Pond-sedge), and *Alopecurus geniculatus* (Marsh Foxtail). Species noted in the delph include *Myriophyllum spicatum* (Spiked Water-milfoil), *Ranunculus aquatilis* ssp. *peltatus* (Common Water-crowfoot), *Alisma plantago-aquatica* (Water Plantain) and *Potamogeton natans* (Broad-leaved Pondweed) with *Eleocharis palustris* (Common Spike-rush), *Epilobium hirsutum* (Great Hairy Willow-herb), *Phragmites communis* (Common Reed), and *Juncus articulatus* (Jointed Rush) at the edge. It was thought that *Ranunculus tripartitus* (Three-lobed Crowfoot) was thought to be present but this needs confirmation and a linear-leaved *Potamogeton* which was found requires determination. *Samolus valerandi* (Brookweed) was found on the clay beside the delph.

Bryonia dioica (White Bryony) occurred at Faxfleet on the wildfowl refuge, at the entrance to which there was a fine tree of *Acer campestre* (Field Maple). Along a field south of Faxfleet Hall *Alopecurus myosuroides* (Black Twitch) was abundant, and *Phyllitis scolopendrium* (Hart's-tongue) was growing at the lock.

The river bank at Faxfleet, built of boulders, was investigated, and a surprising number of salt-marsh species was recorded, although most were present in small quantity only. *Apium graveolens* (Wild Celery) was frequent with *Glaux maritima* (Sea-milkwort), *Aster tripolium* (Sea Aster), *Scirpus maritimus* (Sea Club-rush), *Agropyron pungens* (Sea Couch-grass), and *Festuca rubra* (Red Fescue) occasional. Other species noted included *Plantago maritima* (Sea Plantain), *Triglochin maritima* (Sea Arrow-grass), *Cochlearia officinalis* (Common Scurvy-grass), *Spergularia marina* (Lesser Sea-Spurrey), and *Puccinellia maritima* (Common Saltmarsh-grass). It was interesting to see a few plants of *Barbarea stricta* (Small-flowered Yellow Rocket) here on the shore; *Conium maculatum* (Hemlock) was also recorded. *Plantago coronopus* (Buck's-horn Plantain) was reported from further up river.

Investigation of a pond near the shore revealed only a few species. There were large beds of *Phragmites communis* (Common Reed) and *Scirpus maritimus* (Sea Club-rush), whilst *Ranunculus aquatilis* ssp. *peltatus* was occasional. Two plants of *Crepis biennis* (Rough Hawk's-beard) were seen by the pond.

Bryology (T. L. Blockeel)

For the bryologist, the arid conditions and the uniformity of habitat led respectively to an impoverished flora and considerable recording difficulties, so that only twenty-one species were named. Trees lacked any epiphytes and walls produced only the commonest species. The one habitat which proved at all productive was bare ground in various situations. Dried-out grassland south of Newport (by the lane leading to the Market Weighton Canal at Higham Lodge) was interesting for the small quantities of *Fossombronia* and *Riccia* found there, but both, unfortunately, were too immature for specific determination. However,

Dicranella staphylina (new to V.C. 61) was found here; this small tuberous moss was not described until 1969 but is frequent throughout Britain. I have found it widespread in south-west Yorkshire (V.C. 63), and locally abundant in arable fields. It requires neutral to acid soils.

At the end of the lane, a little distance along the canal, was an excavated pond with much bare ground nearby (obviously wet in winter). Here was good material of *Bryum gemmiferum*, a recent segregate of the *B. bicolor* agg., with the tiny characteristic bulbils abundant in the leaf axils. It is new to V.C. 61. With it were a little *B. bicolor* s. str. and *Dicranella varia*. Miss Robertson also found *Dicranella schreberana*, *Pottia heimii* and *Barbula tophacea* in similar habitats. *Pottia heimii* is a chiefly maritime moss and it was interesting to see a patch of it near one of the communities of maritime flowering plants on the Humber Banks near Weighton Lock. These communities were otherwise quite devoid of bryophytes.

Finally, a quick collection by a small pond at Marr Grange produced a *Drepanocladus*-like growth which in the event proved to be merely *Amblystegium riparium*. I wish to thank Mr M. O. Hill for his help in naming this plant.

Hutton Lowcross (V.C. 62) (17th June)

It was a great pity that the weather for this meeting was of a north-east coast type often experienced in spring and early summer in this part of the region. The cold wind and low cloud produced damp conditions that were most disappointing. The area visited at Hutton Lowcross was forestry land consisting of a large variety of trees in early stages of growth, the area being an experimental one for various forest species. There were several open spaces which in good conditions would have proved interesting to most natural historians. Access to the higher ground was prevented by low cloud cover. There was, however, a good turn out of members from far and wide as well as from the Cleveland area, many of them no doubt having set out in better weather conditions than those that met them in the north-east.

Ornithology (A. C. M. Duncan)

The forestry area we visited lay to the south of Hutton Lowcross and although it was a difficult day for finding birds a total of twenty-eight species was recorded, including Sparrowhawk which we had been particularly asked to look for. The rest were species which are to be expected in such habitats, among them Collared Dove, Blackcap and Garden Warbler.

Arachnology (C. J. Smith)

The weather was poor for collecting specimens but the following species were recorded, mostly from coniferous trees: *Clubiona reclusa*, *C. terrestris*, *C. compta*, *Theridion varians*, *Tetragantha obtusa*, *Meta mengei*, *Gongylidiellum vivum*, *Maso sundevalli*, *Pocadicnemus pumila*, *Silometopus elegans*, *Araeoncus humilis*, *Porrhomma convexum*, *Agyneta conigera*, *Lepthyphantes tenuis*, *L. obscurus*, *Linyphia peltata*.

None of these is unusual in wooded habitats, the most interesting being *S. elegans* which is infrequent. Particular attention was paid to the younger spruce trees since there has been a recent invasion of northern England by the continental species *Pityohyphantes phrygianus*. This is common in coniferous plantations on the Continent, especially in Scandinavia and Germany; it was first recorded in Scotland in 1975 and a large colony was discovered in Dalby Forest in 1977 for the first time in England. Although no specimens were found, the population sampled was too small to be significant.

Flowering Plants (T. F. Medd)

Nearly all the area covered was within the Forestry Commission plantations but it was pleasing to find the many different deciduous trees. Several varieties of *Acer* had been planted and seedlings of *Acer platanoides* (Norway Maple) were noticed. Plants worthy of note included *Vulpia bromoides* (Barren Fescue), *Carlina vulgaris** (Carline Thistle) and a

rather poor specimen of *Dryopteris pseudomas.* Three somewhat unexpected flowers were *Spergularia rubra** (Sand Spurrey), *Sherardia arvensis** (Field Madder), and *Lotus corniculatus* var. *crassifolius* Pers. on spoil heaps left over from smelting operations at the turn of the century. Species not recorded in the *Atlas* for the 10 km grid square 45/61 are indicated by an asterisk, and in all thirteen new such records for the square were added.

Bryology (T. L. Blockeel)

Bryological recording was centred upon the wooded slopes above Hutton Lowcross in square 45/60.13.

The woodland flora was undistinguished and epiphytes were few, though it was pleasing to find a little *Orthotrichum diaphanum* and *O. affine* on sheltered elders. Principal bryological interest was therefore concentrated on the extensive shale banks and outcrops. One small area gave a suggestion of base content with a little *Tortula ruralis* and *T. subulata*, but otherwise the shale had a typically calcifuge flora with quantities of *Polytrichum* spp., *Dicranum scoparium* and *Pleurozium schreberi. Ptilidium ciliare* was found on these open banks in several places among mosses and grasses, and *Barbilophozia floerkei* was also present. One steep outcrop of shale was irrigated and had *Pohlia proligera* lodged in the crevices. Dripping rock under a waterfall on one of the small streams had *Dicranella cerviculata*, *Philonotis fontana* and *Solenostoma sphaerocarpum*. The best find of the day, however, was the rediscovery of *Bartramia ithyphylla* on a sheltered, undisturbed outcrop. In Baker's *Flora* it is described as 'rare in Cleveland, on sandstone rock and on shale near Guisbro'', so this is an old locality, though the species has not been recorded this century. Other habitats provided little that was unexpected, except for male plants of *Dicranella rufescens* covering the sides of a ditch.

The total number of species recorded on the day was fifty-six.

Plant Galls (F. B. Stubbs)

Altogether seventeen galls were found, the majority being on trees. The small nail-galls, attributed to the mite *Eriophyes macrorhynchus aceribus*, appeared on the leaves of both sycamore *(Acer pseudo-platanus)* and Norway Maple *(Acer platanoides)*, but the felted patches of *E. megalonyx* were seen only on sycamore. As in many other areas the mites had fared better than most insect species of gall-agent, several familiar dipterous examples being quite scarce.

Newmillerdam (V.C. 63) (20th–21st May)

The meeting on Saturday concentrated on Seckar Wood, an area of woodland together with heath, grass and marshland derived from former woodland. It lies between approximately 175 and 350 feet O.D. on the east-facing dip slope of the outcrop of Woolley Edge Rock and associated coal measures strata. At the top of the slope lies heathland, on the main eastern slope are damp areas and scrub, while mostly at the foot of the slope various types of woodland occur.

Sunday was spent at Wintersett. The Wintersett and Cold Hiendley reservoirs were built to supply the now disused Barnsley Canal, and below this is an area of marsh along Haw Park Beck. Haw Park, to the north, is a mixed woodland through which the canal runs.

Ornithology (G. Blunt)

A total of sixty-six bird species were noted for the two days of the meeting. Forty-three species were seen at Seckar Wood including such typical woodland birds as the Great Spotted Woodpecker, Blackcap and Spotted Flycatcher. Occupied nests of Long-tailed Tit and Song Thrush were found, a Yellowhammer was feeding young and the bubbling song of the hen Cuckoo was heard.

Newmillerdam produced a list of thirty-nine birds from the water and the surrounding woodlands. Broods of Mallard and Coot were seen as well as two young Mute Swans, and other birds included Whitethroat, Tree Pipit and Yellow Wagtail.

The reservoirs at Wintersett held birds in a variety of habitats and fifty-one species were

noted. Water birds included Gadwall, Shelduck, Tufted Duck, and late Golden Eye, with nineteen Great Crested Grebe on Cold Hiendley. Common Sandpiper and Little Ringed Plover were on the banks with Sedge Warbler, Blackcap, Common Tern, and Great Spotted Woodpecker also present. Snipe and Reed Bunting nests with eggs were found at Cold Hiendley.

Entomology (W. A. Ely)

The varied habitats of Seckar Wood produced a wide variety of insects typical of woodland, heath and marsh in this part of Yorkshire. The marshy areas of the wood held numerous groundbeetles and rove beetles, together with the large cranefly *Pedicia rivosa* (L.) and the local sawfly *Dolerus gessneri* Andre. The scrub woodland yielded many beetles and Mr Payne found *Stilbus testaceus* (Pz.), *Galerucella lineola* (Fab.) and *Lochmaea caprea* (L.). Amongst the weevils *Apion scutellare* Kirby was found on Western Gorse and *Curculio pyrrhoceras* Marsh. on Oak, and Mr Payne collected the local species *Caenorrhinus nanus* (Payk.), *C. longiceps* Thomson, *Dorytomus rufatus* (Bedel), and *Ceuthorhynchus quadridens* (Pz.). An exceptionally late Orange Underwing Moth was reported by Mr and Mrs Flint.

The margins of Wintersett Reservoir held equal numbers of the ground beetles, rove beetles and others typical of such a habitat. The large, snail-eating ground beetle *Cychrus caraboides* (L.) was found beneath dead wood and the swamp vegetation yielded the flea-beetle *Psylloides picina* (Marsh.) and the nineteen-spot ladybird *Anisosticta 19-puncatata* (L.), while a flooded ditch contained a number of water beetles including the local *Hydroporus memnonius* Nicolai. Mr and Mrs Flint collected the Cuckoo-wasp *Nomada goodeniana* from the canal in Haw Park.

Arthropoda (D. T. Richardson)

There are no records of Woodlice, Centipedes or Millipedes from S.E. 31 prior to 1978, but during this meeting five Woodlice, five Centipedes and nine Millipedes were noted, together with two Harvestmen. The Woodlice were all common species, but *Philosica muscorum* was only found amongst the limestone blocks forming the embankment of Wintersett Reservoir. The most interesting of the six Millipedes found at Seckar Wood was *Ommatoiulus sabulosus*, a handsome species with a couple of orange bands along the back, which is associated with sandy soils. The six species found at Wintersett included *Archiboreoiulus pallidus*, a thin, white, subterranean Millipede which was found close to the limestone embankment.

Two Leeches *(Glossiphonia complanata* and *Helobdella stagnalis)* and three Triclads *(Dugesia lugubris*, *Dendrocoelum lacteum* and *Polycelis nigra)* were found at Wintersett, and the water from Haw Park Beck contained 251 ppm of calcium and 187 ppm of magnesium and had a pH of 7.5.

Flowering Plants (D. R. Grant)

This weekend excursion coincided with the first period of warm sunny weather, coming after a long cold winter dominated by easterly winds, and many plants were just starting to flower. All the areas visited were on the coal measures formation, the main rocks being sandstones and shales. The associated soils are generally heavy acid clays which have poor drainage in places, giving rise to bogs. A number of plants with a western distribution have their Yorkshire eastern station in this area.

On the first morning we visited Woolley Moor and Seckar Wood. Woolley Moor is a typical heath habitat with Heather, Bilberry, Wavy-hair Grass and Birch trees. On the flat top of the heath there was a large stand of the Dwarf Western Gorse *(Ulex gallii)* and a few plants of Petty Whin *(Genista anglica)*. There was also a small colony of Crowberry *(Empetrum nigrum)*. On the northern slope the drainage is poor and bogs occur. In these the characteristic plants were Wood Horsetail *(Equisetum sylvaticum)*, Common Spotted Orchis *(Dactylorchis fuchsii)*, Smooth Sedge *(Carex laevigata)* and the two common Cotton grasses.

In the Seckar Wood area, composed mainly of Birches and Sessile Oaks, there were three

uncommon trees, Bird Cherry *(Prunus padus)*, Wild Cherry *(P. avium)* and Whitebeam *(Sorbus aria)*. In the lightly shaded areas Climbing Fumitory *(Corydalis claviculata)* and Yellow Archangel *(Galeobdolon luteum)* occurred.

Seckar Dike runs from the wood under the A61 road into Newmillerdam Park where the afternoon was spent examining the area around the top end of the lake. A number of sedges were seen here; Panicled Sedge *(Carex paniculata)*, Great Pond Sedge *(C. riparia)* and Cyperus Sedge *(C. pseudocyperus)*. In a bog at the feeder stream end there was a colony of Wood Club-rush *(Scirpus sylvaticus)*. Growing nearby were Bladder Sedge *(C. vesicaria)* and Purple Small-reed *(Calamogrostis canescens)*. In the field hedgerows there were some fine examples of Crab Apple trees *(Malus sylvestris)* completely covered in pinkish flowers. A disused railway produced Whitlow Grass *(Eriophila verna)*, Sweet Violet *(Viola odorata)* and Kidney Vetch *(Anthyllis vulneraria)*.

Sunday's excursion was centred on the Haw Park and Wintersett area. There were many interesting aquatics in the disused Barnsley Canal and the two canal feeder reservoirs. At Haw Park there was a colony of Aspen *(Populus tremula)*, Sweet Flag *(Acorus calamus)* and Broad Helleborine *(Epipactis helleborine)*.

Two other colonisers here are the Spurge *(Euphorbia virgata)* and Star of Bethlehem *(Ornithogalum umbellatum)*. In the Chevet railway cutting the Royal Fern *(Osmunda regalis)* was growing on the damp north-east facing side of the cutting. In 1976 fertile fronds had been seen on the plants.

Wintersett Reservoir has a stand of the Common Reed *(Phragmites communis)*, and on the northern shore there is a small colony of Water Chickweed *(Myosoton aquaticum)*.

Bryology (T. L. Blockeel)

On Saturday, the only area examined was the woodland and heathland at Seckar. Most parts of the wooded areas were poor in species. *Sphagnum palustre*, *S. fimbriatum* and *S. squarrosum* occurred in the wetter parts; *Tetraphis pellucida*, as well as *Orthodontium lineare*, was on stumps; *Scapania undulata* grew in quantity in one of the small streams, with a little *Dichodontium pellucidum* on a half-submerged stone. Above the woodland, the dry heathland had an even more impoverished flora, almost exclusively consisting of *Gymnocolea inflata* and *Pohlia nutans*. A much richer area of open boggy ground was eventually located on the north-facing slopes at the transition between woodland and heath. Here three additional *Sphagna* were collected *(S. subnitens*, *S. auriculatum* var. *auriculatum* and *S. recurvum* var. *mucronatum)*. They were associated with *Calypogeia muellerana*, *Cephalozia bicuspidata*, *Aulacomnium palustre*, *Drepanocladus fluitans* c. fr., *Calliergon cuspidatum* and, in smaller quantity, *Bryum pseudotriquetrum* c. fr., *Philonotis fontana* and some elegant beds of richly pink *Bryum pallens*.

The only habitats available for calciphile species were ruined buildings. *Rhynchostegium murale* was on concrete and *Bryum radiculosum* on wall mortar.

Forty-one species were recorded at Seckar. A number of interesting species have been recorded here recently by Mr J. Watson, but on this day most of them proved elusive. Nevertheless, the boggy ground is an important refuge for an ecological association now little seen in the Wakefield district.

On Sunday, Miss Robertson collected in the Wintersett area and found a few additional species. *Amblystegium riparium* was by the reservoir and *Campylopus introflexus* on a dry bank. One puzzling moss, collected from stones beside the reservoir, remains unidentified.

Hellifield (V.C. 64) (1st — 2nd July)

Between twenty and thirty members took part in the two-day excursion, with a few more attending on the Sunday than on the Saturday, under overcast conditions on the first day and somewhat brighter ones on the second. Heavy rainfall during the week caused high levels in the river and becks.

The first morning was spent near Swinden Hall visiting part of the Gill and a marshy field through which Mansell Beck flows, both areas showing the influence of calcareous springs. After lunch the party travelled to Wigglesworth Hall and investigated Wigglesworth Beck

and the banks of the River Ribble for about 1½ miles above Cow Bridge. The whole of Sunday was spent around Arnford, visiting pastures, woodland, marshes, and the banks of the river. Again the influence of calcareous seepage was apparent in at least three areas.

Ornithology (A. C. M. Duncan)

Swinden Gill Wood, a well-wooded deep valley to the south of Hellifield, was visited on Saturday morning. Twenty species of birds were noted, including Dipper, House Martin and Goldfinch, and the nest of a Grey Wagtail with five eggs. In the afternoon the surrounding farmland of Wigglesworth Hall was explored. The Ribble flows slowly through this low-lying area which may be flooded if a reservoir is constructed. The twenty-four species recorded included Heron, Partridge, Snipe, and Redshank, as well as a Kingfisher and a Redstart. There was a rookery at the Hall.

On Sunday, a much brighter day, the route was to Arnford Farm, by the river bank to Arnford Wood and down river to Deepdale Wood where the river passes through a narrow gorge, the most likely site for the dam should the reservoir be built. After this point the river valley opens out to Halton Bridge, the end of the walk. Green and Great Spotted Woodpeckers were seen in Deepdale Wood and a number of Reedbuntings were noted.

Entomology (W. A. Ely)

The areas of marshland near Swinden Hall held a number of insects typical of this habitat, including large numbers of the fly *Chrysopilus cristatus* (Fab.). The uncommon aphid gall *Dysaphis ranunculi* (Kalt.) was found on Hawthorn and Dr Lloyd-Evans collected the gall of *Lipostethus latreillei* (Kief.) on Ground Ivy. This is one of the few gall wasps to occur on herbaceous plants.

Wigglesworth Beck on the Saturday afternoon contained the water beetle *Platambus maculatus* (L.), characteristic of such situations, with the shorebug *Saldula scotica* (Curtis) among the gravel. The Chimney Sweeper Moth was present, and numbers of Small Tortoiseshell Butterfly larvae were feeding on the beds of nettle together with the weevils *Phyllobius viridicollis* (Fab.) and *P. viridiaeris* (Laicharting). The click beetle *Selatosomus incanus* (Gyllenhal) was swept from vegetation and cow pats yielded the local dung beetles *Aphodius depressus* (Kugelann) and *A. rufus* (Moll.). One of the last insects of the afternoon was the cranefly *Ctenophora nigricornis* Mg. at Wigglesworth Hall.

The marshland by the river at Arnford contained good numbers of insects, including the click beetles *S. incanus* and *Athous hirtus* (Herbst.), the Field Chafer *Phyllopertha horticola* (L.) and the weevils *Cionus scrophulariae* (L.) on figwort and *Ceutorhynchus litura* (Fab.). Rhinoceros beetles *Sinodendron cylindricum* (L.) were present in the alder logs and Green Grasshoppers *Omocestus viridulus* (L.) in the grassland. Mr Norris collected the assassin fly *Dioctria rufipes* (Degeer) and Mr Kendal and Mr Richardson found the click beetle *Denticollis linearis* (L.) in Arnford Wood. The most notable insect taken here, indeed the most notable of the weekend, was the alderfly *Sialis nigripes* Pictet. This insect was added to the British list on the basis of two specimens collected in Ireland in 1976, and subsequent research in the British Museum (Natural History) has revealed specimens from south-east to central Ireland and southern England. The presence of *S. nigripes* in Yorkshire is a marked extension of its known range.

The banks of the river at Halton Bridge held fewer insects. More Small Tortoiseshell larvae were present as well as one larva of the Mullein Shark Moth *Cucullia verbasci* L. on figwort, and the local soldierfly *Microchrysa cyaneiventris* (Zett.) was found. A number of river whirligig beetles *Orectochilus villosus* (Muller) were found resting under a stone by Pan Beck. The blackthorn bushes by the roadside here were very heavily infested with the gall mite *Eriophyes similis* Nal. and the capsid bug *Calocoris major* (Schilling) was swept here.

Arthropoda (D. T. Richardson)

Collecting was carried out in Swinden Gill Wood and in the lane leading from Swinden Hall to the wood, at Wigglesworth Hall Farm, Wigglesworth Hall Laithe, Arnford Farm, Arnford Wood, and on the banks of the River Ribble leading to and adjacent to the wood. Swinden

Gill and Mansell and Wigglesworth becks were also examined. Most of the species taken are of general distribution and a single list is given. Species not previously recorded for the 10 km grid square 34/85 are indicated by an asterisk.

Woodlice — *Oniscus asellus* L., *Porcellio scaber* Lat., *Trichoniscus pusillus* (Brandt), *Philoscia muscorum* (Scopoli), *Haplophthalmus mengei* (Zaddach) by A. Norris under stones in the lane leading from Swinden Hall to the gill and *Androniscus dentiger* Verhoeff by Dr Lloyd-Evans under stones in the yard of the Black Horse Hotel, Hellifield. (The finding of *H. mengei* is of interest as to date there are less than a dozen records for this species in Yorkshire.) Millipedes — *Blaniulus guttulatus* (Bosc)*, *Brachydesmus superus* Latzel*, *Cylindroiulus punctatus* (Leach), *Glomeris marginata* (Villers), *Julus scandinavius* (Latzel), *Ophyiulus pilosus* Newport, *Polydesmus angustus* Latzel, *Proteroiulus fuscus* (Am Stein), and *Tachypodoiulus niger* (Leach). Centipedes — *Lithobius calcaratus* C. L. Koch, *L. crassipes* L. Koch, *L. forficatus* (L.), *L. melanops* Newport*, *L. variegatus* Leach, and *Necrophloeophagus longicornis* (Leach). Harvestmen — *Megabunus diadema* (Fab.), *Mitopus morio* (Fab)*, *Nemastoma bimaculatum* (Fab.), and *Phalangium opilio* L.* Freshwater triclad — *Polycelis felina* (Dalyell)* in both Swinden Gill and Mansell Beck. Leeches — *Glossiphonia complanata* (L) and *Helobdella stagnalis* (L) in Swinden Gill and *Erpobdella octoculata* (L)* in Wigglesworth Beck. Freshwater shrimp *Gammarus pulex* (L) in Swinden Gill and Mansell Beck. Calcium carbonate content of the waters was as follows, Swinden Gill 269 mg per litre, Wigglesworth Beck 134 mg per litre and Mansell Beck 281 mg per litre.

Vascular Plants (J. R. Hickson)

Although the Hellifield square 34/85 is relatively under-recorded in the *Atlas*, during recent years this situation has been largely corrected and at least 220 species have been added to the list of vascular plants, plus a further fourteen species during this two-day meeting.

Most of the areas visited were well-grazed by sheep or cattle or used for other agricultural purposes and the more interesting plants were found in special habitats where grazing had been reduced for one reason or another. The steeper banks of the River Ribble, particularly above Cow Bridge, provided protection for plants such as *Scirpus lacustris* (Common Club-rush) and *S. sylvaticus* (Wood Club-rush), whilst the river itself provided a home for various water plants including *Ranunculus peltatus* (Water-crowfoot), *Nuphar lutea* (Yellow Water-lily) in fine display above Cow Bridge, *Potamogeton natans* (Broad-leaved Pondweed) and *P. perfoliatus* (Perfoliate Pondweed). Probably many more species would have been seen had the water been at a lower, more normal level. Also along the river banks *Rorippa sylvestris* (Creeping Yellow-cress), *Ribes rubrum* (Red Currant), *Polygonum amphibium* (Amphibious Bistort), *Scrophularia umbrosa* (Green Figwort), *Veronica filiformis* (Slender Speedwell), *Campanula latifolia* (Giant Bellflower) and, at Swinden, *Allium scorodoprasum* (Sand Leek) were noted.

The bulk of the less common species were discovered in the marshy ground produced by a few calcareous springs, notably at Swinden Gill, Mansell Beck, below Arnford Wood, Broken Brow and near Snell Holme Bridge. The most notable finds were *Potentilla palustris* (Marsh Cinquefoil), *Primula farinosa* (Bird's-eye Primrose), *Menyanthes trifoliata* (Bogbean), *Pedicularis palustris* (Marsh Lousewort), *Pinguicula vulgaris* (Common Butterwort), *Galium uliginosum* (Fen Bedstraw), *Juncus subnodulosus* (Blunt-flowered Rush), *Eriophorum latifolium* (Broad-leaved Cottongrass), *Eleocharis quinqueflora* (Few-flowered Spike Rush), *E. uniglumis* (Slender Spike Rush), *Blysmus compressus* (Flat Sedge), *Schoenus nigricans* (Black Bog Rush), *Carex hostiana* (Tawny Sedge), *C. lepidocarpa* (Long-stalked Yellow Sedge), *C. rostrata* (Bottle Sedge), *C. disticha* (Brown Sedge) and *C. dioica* (Dioecious Sedge).

The less common species seen in the drier grassland included *Ophioglossum vulgatum* (Adder's-tongue) below Arnford Wood, and *Carex pallescens* (Pale Sedge) and *C. muricata* (Prickly Sedge) in Arnford Wood. Other species included *Montia sibirica* (Pink Purslane) by Wigglesworth Beck, *Genista tinctoria* (Dyer's Greenweed) near Snell Holme Bridge, *Salix pentandra* (Bay Willow), a large tree near Swinden Hall, *Veronica catenata* (Pink Water-

speedwell) and *Galium odoratum* (Woodruff) in Swinden Gill, a large stand of *Carex paniculata* (Greater Tussock-sedge) near Cow Bridge, and a large specimen of *Rhamnus catharticus* (Buckthorn) together with *Salix aurita* (Eared Willow), in the lane-side near Cow Bridge. A total of over 270 species was recorded for the meeting.

Bryology (T. L. Blockeel)

The first morning was devoted to Swinden Gill, but the bryophyte flora was limited by the absence of extensive rock exposures and the open, grazed nature of the woodland. The small stream had *Fissidens crassipes* on stones and *Pohlia carnea* on its banks; *Cirriphyllum crassinervium* was on a small limestone outcrop, and *Campylopus introflexus* on the gritstone of the railway bridge; epiphytes were poor, with little other than *Dicranoweisia cirrata* and *Aulacomnium androgynum*. A calcareous marsh had *Cratoneuron commutatum* and *Campylium stellatum*, with a little *Eucladium verticillatum* growing, as it often does, on the 'tufa' formed by calcium deposits on old stems of the *Cratoneuron*. Two other marshes were examined during the meeting: the one near Swinden Hall added *Climacium dendroides* to the day's list, and that by Pan Beck produced *Philonotis calcarea* c. fr. and a little each of *Plagiomnium elatum*, *Aulacomnium palustre* and the hepatic *Riccardia pinguis*.

Much time was spent on an examination of the riparian flora of the Ribble. River banks are a most interesting habitat with a characteristic bryophyte flora, many species being restricted to trees and rocks within the flood zone. The best find on this occasion was the neglected moss *Orthotrichum sprucei*, which I have previously seen in several localities in the lower Ribble Valley near Clitheroe. Other species were *Tortula latifolia*, *T. subulata*, *Barbula recurvirostra*, *Orthotrichum affine*, *O. diaphanum*, *Homalia trichomanoides*, *Leskea polycarpa*, *Amblystegium fluviatile* and *Porella platyphylla*, all on trees, and *Cinclidotus fontinaloides*, *Barbula spadicea*, *B. trifaria*, *Oxystegus sinuosus* and *Schistidium alpicola* var. *alpicola*, all typically on rocks.

Many limestone walls were examined during the two days, but only the usual species were found, including *Zygodon viridissimus* var. *viridissimus* near Wigglesworth Hall.

A few other finds may be mentioned: *Dicranella rufescens* on a stream bank near Wigglesworth Hall, *Bryum rubens* on a bank in pasture near Arnford, and *Polytrichum longisetum* c. fr. with a few scraps of *Sphagnum recurvum* var. *mucronatum* in a damp depression with rushes, also near Arnford. A total of eighty-six species was recorded during the meeting.

Bainbridge and Addlebrough (V.C. 65) (15th July)

In dry but rather cool weather, some forty members joined this excursion, nineteen societies being represented. The morning was spent on the wooded scar and adjoining pastures, and in the afternoon the higher slopes of Addlebrough were covered. The area proved to be of average interest for an upland limestone locality and gave no surprises. However, a few welcome finds were made and investigation of some of the limited moist sites was rewarding.

After tea at the Rose and Crown Hotel in Bainbridge, the President, Mrs J. E. Duncan, took the chair when reports were presented. Mrs J. Payne expressed the thanks of the meeting to the farmers who had kindly allowed access to their lands, and to Mr and Mrs F. B. Stubbs who had made the arrangements. She also spoke in appreciation of the energetic work of the Excursions' Secretary, Miss J. Robertson.

Ornithology (A. C. M. Duncan)

The first area visited was the mixed woodland of Worton Scar where a number of typical species were recorded. In the afternoon species seen over the moorland to the summit of Addlebrough included Oystercatcher, Golden Plover, Buzzard, and Kestrel. Thirty-four species were noted including Common Gull, Wheatear, Spotted Flycatcher, and Yellow Wagtail.

Arthropoda (D. T. Richardson)

Collecting was confined almost entirely to Worton Scar Wood, which lies in 10 km grid

square 34/98. Species not previously recorded for this grid square are indicated by an asterisk.

Woodlice — *Oniscus asellus* L., *Porcellio scaber* Lat., *Trichoniscus pusillus* (Brandt), *T. pygmaeus* Sars.*, and *Porcellio spinicornis* Say*, the latter species being confined to the limestone walls. Millipedes — *Tachypodoiulus niger* (Leach), *Cylindroiulus punctatus* (Leach), *Glomeris marginata* (Villers), *Polymicrodon polydesmoides* (Leach)*, *Julus scandinavius* (Latzel)*, all are commonly found in the habits represented. Centipedes — *Lithobius crassipes* L. Koch, *L. variegatus* Leach*, *Geophilus insculptus* Attems*, and *Strigamia acuminata* (Leach)*. The last species is a woodland animal which, although relatively common in England and Wales, has not as yet been found many times in Yorkshire. Harvestmen — *Mitopus morio* (Fab.), (also on summit of Addlebrough), *Megabunus diadema* (Fab.)*, *Oligolophus hansenii* (Kraepelin)*, and *O. meadii* (Cambridge)*. The last is the smallest of our harvestmen and is found in dry situations. Examination of a small spring at Carpley Green (34/945875) provided the freshwater shrimp *Gammarus pulex* L.* and the freshwater triclad *Crenobia alpina* (Dana)*. The water temperature was 18.5°C, and the calcium carbonate content 41 mg per litre. The presence of *C. alpina* in a water of this temperature was interesting as this species is considered non-tolerant of temperatures of over 15°C for any length of time.

Plant Galls (F. B. Stubbs)

Few galls were seen, but the list included two which are quite local and uneven in their distribution. These were the reddish stem-gall on Lady's Bedstraw *(Galium verum)* attributed to the midge *Geocrypta galii*, and the patches of minute pale-coloured pustules caused by the mite *Eriophyes aucupariae* on the leaves of Mountain Ash *(Sorbus aucuparia).*

Flowering Plants and Ferns (J. E. Duncan)

Wooton Scar, north-facing and thickly wooded and the start of the morning's walk was dry and overshadowed, not producing a long list of species. However, a number of calcicoles were observed in the more open part along the top.

The afternoon was spent on the slopes of Addlebrough where members worked in groups, thus covering a wide area. Vegetational changes were noted from acid to more basic areas, limestone outcrops and flushes were also of interest, and the moss north of Addlebrough was found to be much drier than in former times when there were pools which have now disappeared. *Hornungia petraea* was seen in its known site on the limestone outcrop towards the summit.

The list of species totalled 166 of which twenty-eight were previously unrecorded for the grid square SD/98. These are mostly common species but included *Selaginella selaginoides*, *Erophila verna*, *Viola lutea*, *Sedum acre*, *Pimpinella saxifraga* and *Rumex longifolius.*

By far the most significant record for the day was the finding of *Crepis mollis* by Mr I. C. Lawrence. The identification was confirmed by Dr Sledge who considered its refinding in Wensleydale to be very important; there is a record more than a century old for it in Bain Gill given in Baker's *Flora of North Yorkshire*.

Other species noted included: *Ophioglossum vulgatum*, *Cochlearia alpina*, *Draba incana*, *Saxifraga tridactylites*, *S. hypnoides*, *Pinguicula vulgaris*, *Galium sterneri* and *Triglochin palustre.*

Bryology (T. L. Blockeel)

The variety of habitats allowed a rich selection of bryophytes to be seen, and 105 species were recorded in all.

The first part of the day was spent along the wooded scar a little above the road between Worton and Bainbridge. Records made on the way there included *Thuidium philibertii* and *Rhytiadelphus triquetrus* on a grassy bank by the road. The scar itself produced nothing unexpected, but *Metzgeria pubescens*, *Neckera crispa* and *Anomodon viticulosus* were notably luxuriant. *Isothecium myurum* was on a tree, and *Scapania aspera* on the wall at the foot of the wood. Other walls in this area produced *Ditrichum flexicaule*, *Oxystegus sinuosus* and *Zygodon viridissimus* var. *viridissimus* in addition to the usual species.

Next a small stream and its environs were visited, south of Carpley Green. Records included *Plagiomnium elatum*, *Philonotis calcarea* and *Climacium dendroides* in a calcareous flush, *Gymnostomum aeruginosum* on a rock outcrop, *Ditrichum heteromallum* on a peaty bank, *Hygrohypnum luridum* on stones, and, rather surprisingly, *Rhacomitrium aciculare* and *R. fasciculare*, looking out of place in a limestone area.

Late in the day, the bog below the north slopes of Addlebrough produced some good finds. Seven *Sphagna* occurred, the most noteworthy being a rare Yorkshire species, *Sphagnum magellanicum*. There was a little *Drepanocladus exannulatus* and a number of characteristic bog hepatics: *Ptilidium ciliare*, *Mylia anomala*, *Odontoschisma sphagni*, *Cephalozia connivens* and barren material of a *Lepidozia* subgenus *Microlepidozia*.

Twice during the day the opportunity was taken to examine the banks of the Ure. Near Aysgarth a patch of *Leucodon sciuroides* at the base of an ash was a pleasing find. Once a common epiphyte in Yorkshire, this species has receded in the face of atmospheric pollution and is now absent over large areas. A little of it was also seen on a wall by the main road. *Orthotrichum* was well represented by the river, with *O. cupulatum* var. *riparium*, *O. affine*, *O. diaphanum* and the riparian duo *O. rivulare* and *O. sprucei*. The last species, though given for many streams in Baker's *Flora*, has not been recorded for V.C. 65 during the present century. I have no doubt that it is a neglected species which will probably prove widespread in its habitat. In fact, it is commoner in my experience than *O. rivulare*. Other records from the Ure were *Tortula latifolia*, *T. subulata* and *Leskea polycarpa* on trees, and *Schistidium alpicola* and *Cirriphyllum crassinervium* on rocks.

ENTOMOLOGICAL REPORTS FOR 1977–78

Hemiptera (R. Crossley)

It is pleasing to report that work on this Order of insects is steadily increasing and some very interesting records have been submitted during the two years under review. Although the true bugs have received close attention from several generations of collectors in the county the unexpected still occurs. This is demonstrated by Mr Flint's experience at Barmby Moor (V.C. 61) on 22nd May 1977 when he found *Berytinus minor* (H.-S.) and *Peritrechus lundi* (Gmel.). Both species have been recorded before in Yorkshire, but only once, and both prior to 1924, the first species having been found at North Cave and the second at Spurn.

The minute ground-dwelling mirid bug *Chlamydatus saltitans* (Fall.) is easily overlooked so there is perhaps little significance in its discovery at two new localities in 1977. However, it is difficult to understand how the strikingly handsome shieldbug *Troilus luridus* (Fab.) could have been missed in the past: perhaps it normally lives high up in the foliage of trees beyond the normal range of the net or beating tray. The same cannot be said of the equally distinctive Pied shieldbug, *Sehirus bicolor* (L.), which occurs on White Dead-nettle *(Lamium album* L.*)*. There would appear to be evidence of genuine extension of the range of this insect since it was first discovered in the county in 1968, and full details of its subsequent spread are given below. The same is probably true of the lygaeid bug *Ischnodemus sabuleti* (Fall.) which is known to have been spreading from its original localities in south-east England since the early 1920s.

The distinctive little lacebug *Monanthia humuli* (Fab.) which was discovered at three separate localities during 1978 perhaps falls into an entirely different category. The host plants are Water Forget-me-nots (*Myosotis* spp.) and the first specimen was found quite unexpectedly by casually sweeping mixed bog vegetation in a very wet gutter. Once discovered, a similar collecting technique in likely looking habitats elsewhere produced further specimens. It is most unlikely that this species is a new arrival in the county: more probably it has been missed in the past because collectors have not worked the rather specialised wet habitats where it lives.

Records have been received from Messrs W. A. Ely, J. H. Flint, P. Kendall, Dr L. Lloyd-Evans, Messrs B. S. Nau, A. Norris, and K. G. Payne, to all of whom I express my thanks.

In the list which follows new county records are indicated thus † and new vice-county records thus *.

Heteroptera (R. Crossley)

**Sehirus bicolor* (L.) (64) Carlton, 15/7/77; K.G.P. First recorded in Yorkshire at Adwick-le-Street (63) in 1968, it was subsequently found there in abundance and then in the following localities: Hatfield Moor (63), 1970; Pocklington Canal (61), 1970; Wauldby (61), 1971; Wheldrake Ings (61), 1976; Goole Moors (63), 1976; Wentbridge (63), 1977; South Milford (64), 1978.

**Troilus luridus* (Fab.) (62) Strensall Common, 26/7/73; K.G.P. Recorded from Skipwith Common in 1974.

**Ischnodemus sabuleti* (Fall.) (61) Howden Marsh, swarming (possibly a sign of fresh colonisation), 1/5/77; P.K. Londesborough Park, 3/7/77; B.S.N. (*64) Carlton Towers, Goole, abundant, 15/7/77; K.G.P. Previously recorded in Yorkshire from Potteric Carr, Doncaster (63), 1971, and Inkle Moor, Thorne (63), 1972.

**Acalypta brunnea* (Germ.) (64) Strid, Bolton Abbey, 9/8/78; A.N. A single specimen found in liverworts collected near the river bank.

†*Monanthia humuli* (Fab.) (64) Near Carthick Wood, Collingham, 18/6/78, 22/7/78; R.C. Askham Bog, 1/9/78; R.C. (*63) Shirley Pool, Askern, 26/8/78; R.C.

**Conostethus griseus* D.&S. (61) Spurn, abundant ex. Sea Lavender (*Limonium vulgare* Mill.), 16/7/75; J.H.F. A salt marsh bug said to be widely distributed on the east coast, but previously only recorded in Yorkshire at Middlesbrough in 1934.

†*Psallus flavellus* Stichel (62) Forge Valley, Scarborough, 1978; L.L-E.

Chlamydatus saltitans (Fall.) (61) Skipwith Common, 11/9/77; J.H.F. (*64) Grafton, Boroughbridge, in sand quarry, 3/9/77; R.C.

†*Orthotylus virens* (Fall.) (64) Near Carthick Wood, Collingham, abundant in sedge bed, 22/7/78; R.C. A species associated with Bay Willow (*Salix pentandra* L.), and apparently with a very restricted range in Britain, being previously known only from Cumberland and Westmorland.

Capsus wagneri Rem. (64) Bowlam Dyke, Ulleskelf, 13/6/70; K.G.P. For a number of years after 1954, when this species was first recognised in Britain, it was known only from Wicken Fen, Cambridgeshire and Askham Bog. However, in 1968, and again in 1969, single males were taken in a marshy field adjoining Pocklington Canal at Melbourne (61). This latest record, from Ulleskelf, adds another locality on the Plain of York to the range of this species, although the very strong Askham Bog population still remains the principal one in north-east England.

**Salda morio* Zett. (65) Addleborough, 15/7/78; J.H.F.

**Teloleuca pellucens* (Fab.) (62) Rosedale Moor, 3/9/77; J.H.F. This is the first record from the moorlands of north-east Yorkshire, all the other known localities being in the high Pennines, with the exception of an outlying population at Thorne Moors.

**Aphelocheirus aestivalis* (Fab.) (62) ex. River Rye near confluence with River Derwent, 1973; Yorkshire Water Authority per A.N. (61) Several records during 1977 from various stations along the River Derwent upstream from Stamford Bridge; Yorkshire Water Authority per A.N. The only previous Yorkshire record for this remarkable aquatic bug is also from the River Derwent, at Malton in 1937.

Plea atomaria (Pallas) (61) Hemingborough, abundant, 9/9/78; J.H.F. This 'lesser water boatman' has only been recorded twice before in Yorkshire, the first being at Market Weighton, prior to 1921, and at Spurn about 1950.

The following species are recorded for the first time in the vice-counties indicated but do not call for special comment.

V.C. 61: *Psallus perrisi* Wagner; *Dicyphus annulatus* (Wolff); *Microvelia reticulata* (Burm.).

V.C. 62: *Nysius thymi* (Wolff); *Megalocoleus molliculus* (Fall.).

V.C. 63: *Dictyonota strichnocera* Fieb.; *Psallus luridus* (Reut.); *Orthotylus ochrotrichus* Fieb.; *Corixa dentipes* (Thoms.).

V.C. 64: *Piezodorus lituratus* (Fab.); *Nysius thymi* (Wolff); *Heterocordylus tibialis* (Hahn); *Calocoris roseomaculatus* (De Geer).
V.C. 65: *Dicyphus pallicornis* (Meyer Dür); *Stenodema calcaratum* (Fall.).

Homoptera (J. H. Flint)
Euides speciosa (Boh.) (64) Sherburn Willows Nature Reserve, 14/6/78; J.H.F. Third Yorkshire locality, the others being Askham Bog and Ellington Banks, Ripon; in sedge beds.

BOOK REVIEWS

Bird Families of the World edited by **C J O Harrison** and illustrated by **Ad Cameron**. pp 261. Phaidon Press, 1978. £9.95
The text is contributed by an international team of widely recognized experts in their respective fields.

Accepting that taxonomists do not universally agree on all premises relating to classification, the text proceeds logically from primitive links between reptiles and birds, through evolutionary development to the most advanced Corvidae. Each family, including extinct species, is dealt with — its composition, world-wide distribution, feeding, nesting and young, economic importance, and behaviour are the main headings under which the various authors have contributed. In this way a certain standardization is achieved, although it is perhaps inevitable that there is unevenness of treatment. For example, compared with virtually a page on Sheathbills, of which there are only two species, the thirty-five lines devoted to thirty-six species of terns must be considered very inadequate, with no distinction between Marsh and Sea Terns and virtually no information on feeding.

A further lack of consistency occurs in the legends to the illustrations where confusion can arise on account of numbers preceding names in some cases and in others following them. The transposing on p 60 of the names of Coscoroba and Whooper Swan, and such errors as the mis-spelling of the latter, and giving the specific name of Garganey as guerguedula should have been eliminated at the proof stage.

Generally speaking the text is informative and includes a wealth of statistical material. There are of course, no detailed identification descriptions (some 8600 would be involved). The 261 quarto pages are very lavishly illustrated, the Dutch artist, Ad Cameron, portraying over 900 species in colour. Some are straightforward portraits, others depict the birds in livelier postures or illustrate some aspect of behaviour.

As a book of reference it is easy to use; for the quality and quantity of its delightful illustrations and beauty of layout it is a sheer joy and will be prized not only by ornithologists.

RFD

The Crows by **Franklin Coombs**. pp 244. Batsford, 1978. £7.95
The Corvids are a group in which Dr Coombs has been especially interested and on which he has been publishing notes and papers since the mid-1940s. This present study is a splendid welding together of his own observations and research into those of other authorities. That the latter has been an extensive exercise thoroughly done is denoted by the fact that there are fifteen pages of references.

After initial sections on Crows and Man and relationships within the Corvidae, the eleven European species of the family are each dealt with in separate chapters following a set pattern. A final species-chapter is an account of the Great Spotted Cuckoo which is parasitic on a number of corvine species; and this is followed by comparing corvids, and a chapter on Lewis Harding which is comprised mainly of quotations from the notes he made in a year-long study of Rooks at Trelawne in 1847–48.

The eleven full species, plus Hooded Crow and Great Spotted Cuckoo are illustrated by black and white photographs. Those responsible for the originals will not all be satisfied with

the standard of reproduction. There are four colour plates of paintings by the author, of which those showing plumage variations of different races of Jay and Jackdaw are particularly valuable. Excellent also are his own fifty-six line drawings to illustrate postures and displays, with wing fluttering skilfully conveyed.

With such an outstanding work, it seems almost churlish to point out some small flaws. On p 21 a sentence on Raven distribution could be misinterpreted due to faulty punctuation. There is a curious entry in the references ('Leach E. P., British Recoveries of Birds Wings Abroad . . .'). The adaptability of crows is commented on but with no special mention of Rooks nesting within towns or venturing on to motorways to feed. The problems posed by Dutch Elm disease for a species which has 90 per cent of nests in elms in some parts of the country should perhaps have been highlighted, if only to alert observers to note changes. There are four separate references to Rooks re-using old nests within the space of pp 92–3, and repetition on seasonal changes in roosting habits occurs on p 101.

Such minor criticisms apart, this is a very important addition to the ornithological literature.

RFD

Bird Flight by **Georg Rüppell**. pp 191. Reinhold, 1977. £15.35
An American translation of the original German 'Vogelflug', first published in 1975.

The author progresses from an initial discussion on how the force of gravity has been overcome by a variety of animal forms, and a brief history of man's early efforts in this field, to a special study of bird flight and the special anatomical adaptations birds have for flying. This is followed by more detailed consideration of the different forms of bird flight and manoeuvring.

There are few pages without illustrations or photographs and although these are not listed, the liberal treatment greatly enhances the attractiveness of the book and assists an understanding of the complexities of bird flight.

There is discussion of the various photographic techniques by which for example stills are produced at 1/40,000 sec flash, enabling not only complex movements to be analysed, but even positions of individual feathers to be examined.

RFD

The Beagle Record edited by **R D Keynes**. pp xiv + 409, including map and many monochrome and coloured plates. Cambridge University Press, 1979. £30
Interest in Darwin continues unabated: the media have been particularly active during 1978–79 in presenting material both of a popular and of an academic nature. One aspect of his life and work which has proved particularly attractive to a wide audience has been that connected with his travels on HMS *Beagle*.

This latest volume provides in a most pleasing manner selections from the original pictorial records and written accounts of his voyage: extracts from letters, diaries and books by (and about) Darwin, FitzRoy, Martens, and others (some published for the first time, and many other written sources currently out of print) are complemented by delightful illustrations, mainly pencil and watercolours by Martens, the *Beagle*'s official artist. Numerous illustrations have not been published before, and the colours of those which have been published previously (eg in *A Narrative of the Voyage of H.M.S. Beagle*, 1977, David Stanbury, ed, The Folio Society) vary considerably from the book under review. In such a sumptuous volume, one hopes that these are faithful reproductions of the originals.

Similarly the various published transcripts vary considerably: there are often appreciable differences (sometimes as a result of editorial licence) in content, punctuation and typographical arrangement of text. This poses the question 'which is to be accepted as the definitive text?'. Inaccurate transcripts provide an unsatisfactory basis for scholarship: for instance, the postscripts (in reverse order) appearing at the end of a letter dated 24 August 1833 in The Folio Society edition (p 166) are correctly placed at the foot of a letter dated 4 October 1833 in Keynes (p 160).

Keynes' work is undoubtedly authoritative, but it also largely duplicates previously published material — for example, Darwin's many letters to Henslow (with the exception of three — nos 29, 35 and 36), that are associated with his voyage and contained in Nora Barlow's definitive work on the subject, have also been included by Keynes. On the other hand, an interesting reply by FitzRoy (dated 20 October 1836) to Darwin's letter dated 6 October 1836 has been omitted — no doubt the editor wished Darwin to have the last word!

With some confidence I choose Keynes for accuracy, but as a reference work the reviewer has some reservations since this volume is overpriced as a 'coffee-table' book but over-lavishly produced for purchase by scholars as a working text.

MRDS

Ecology and Phytogeography of High-altitude Plants of the Northwest Himalaya by **M S Mani.** pp xii + 205 (including 49 text figures), plus 42 pages of photographic plates (3 in colour). Chapman and Hall, 1979. £14

A useful contribution to our knowledge of high-altitude plants resulting from a detailed study of a fascinating and remote region of the world by Professor Mani, better known for his entomological research and publications. Presumably the high price of this book is due in part to the numerous photographic plates, which unfortunately do very little to enhance the text.

Flora of Barro Colorado Island by **Thomas B Croat**. pp viii + 943 (including many black and white photographic plates and numerous line drawings), plus maps on endpapers. Stanford University Press, 1978. $55

This beautifully produced and lavishly illustrated volume is a worthy climax to detailed investigations (mainly during the past ten years) of a small island preserve only six square miles in area situated in the Panama Canal. The island's rugged terrain is blanketed by tropical rain forest and supports more than 1350 species of vascular plants — a total approaching that of the British flora!

This impressive work contains perhaps the most comprehensive taxonomic treatment of a tropical flora ever published, with detailed descriptions of all the island's taxa, keys to their identification (including a 49-page key to approximately 700 species of sterile woody plants), ecological and phytogeographical data, times of flowering and fruiting, and nearly 600 photographs taken by the author in the field. An analysis of the island's climate, geology, soils, ecology, geographical affinities, etc, is provided in a 61-page introduction.

Both author and publisher are to be congratulated, and the relatively high price of this book is entirely justified.

MRDS

An Introduction to the Deer f Australia by **Arthur Bentley**. pp 350, with 92 monochrome illustrations and 14 colour plates. Printing Associates, Hurstbridge, Victoria, Australia. 2nd ed 1979. $A21.50

To those of us who thought the mammals of Australia consisted of marsupials, monotremes, bats, rodents, dingoes, and a few other small species such as rabbits, it comes as something of a surprise to discover that several species of deer have been introduced and successfully established themselves. The commonest species are the Sambur from Ceylon, Hog Deer from the Himalayas and Red and Fallow Deer from Europe. Attempts have been made to introduce at least ten other species.

Mr Bentley's book provides a full account of the early attempts at introduction, which certainly up to the turn of the century was looked upon with considerable favour. He goes on to provide accounts of the biology of those species established in Australia. This is followed by descriptions of their status within each state. Fourthly, there are chapters on hunting, antlers, plants used by deer and captive deer.

The account is useful in so far as the author has gone to considerable efforts to bring together all the historical and contemporary information on Australian deer. In this respect

it is a very full account. Unfortunately, such data is, by its very nature, remarkably fragmentary and as a result the account does not read with the fluency of a better known subject. The book is a useful reference source for the sportsman, range manager and naturalist in Australia but I cannot see that it can be more than of passing interest to readers in this country.

MJD

Big Game of North America. Ecology and Management compiled and edited by **John L Schmidt** and **Douglas L Gilbert** and illustrated by **Charles W Schwartz**. pp xviii + 494 (including 77 figures, 47 tables and numerous monochrome plates), plus 8 pages of coloured plates. Stackpole Books, Harrisburg, Pennsylvania, 1978. £13.45
Reference material presented in a lucid and pleasing manner by several leading authorities on the subject. The first part of the book deals with the autecology and management of each of the big game mammals of N America, and the second half deals with such topics as population dynamics, behaviour, nutrition, pathology, predation, and habitat management.

The Seals and the Scientists by **L Harrison Matthews**. pp 219. Peter Owen, 1979. £7.50
A racy account, by the doyen of Britain's seal and whale biologists, of his research on Grey and Common Seals during the late 1940s and 50s. Small-boat work, visits to off-lying islands and sandbanks, breakfasts in country pubs, and patient studies of interesting animals in the company of R M Lockley, Professor Amoroso, Francis Fraser, Humphrey Hewer, and other lively pioneers: a good story well told.

BS

The Physiological Ecology of Tunas edited by G D Sharp and A E Dizon. pp xvi + 485. Academic Press, 1978. $29.50
This volume of twenty-two papers is based on a Tuna Physiology Workshop held at La Jolla, California in 1977. Papers are grouped in sections covering the systematics and adaptations of the tunas, mackerel and related high-speed Scombroid fishes, their musculature, cardiovascular and respiratory systems, the biochemistry of their swimming muscles, the thermal balance, hydrodynamics and energetics of tunas, and practical applications of tuna physiology studies. Together they provide a thorough and up-to-date account of research on the physiology of this interesting group of fishes; a well-organized book for the specialist library.

BS

Social Play in Primates edited by **Euclid O Smith**. pp xii + 324. Academic Press, 1978. £11.70
A collection of eleven papers on aspects of play in free-ranging and captive primates, arising from a symposium of the Animal Behavior Society of Pennsylvania State University. A historical review of the study of play is followed by contributions on the ontogeny of play behaviour, play in normal and gonadectomized Rhesus Monkeys, aspects of play in captive great apes, functions of play, reinforcement theories of play, object-play, and a study of play in children of a Californian community school. A stimulating group of papers, of especial interest to anthropologists, primate ethologists and all who are interested in the evolution of human behaviour.

BS

Life on Earth by **David Attenborough**. pp 319, including many coloured photographic plates. Collins/BBC, 1979. £7.95
Originally intended to back-up one of the most attractive natural history series presented recently on television, this book must nevertheless be judged as an independent entity. Its most immediately striking feature is the numerous plates: the majority of these are out-

standing in quality, but a few are disappointingly dark and in one case (p 23) the captions are reversed. Although the text is clearly written and the content attractively presented, one cannot entirely agree with the publishers that this book 'will become a standard introduction to natural history'. The material is biased towards the animal kingdom (in fact only one chapter deals with plants) and is unavoidably condensed, resulting in a simplistic treatment of evolution; furthermore there is no bibliography to encourage further reading beyond the standpoint taken. Nevertheless the book will undoubtedly prove attractive to a very wide audience, many of whom it is to be hoped will pursue the subject further.

VAH

River Plants by **S M Haslam**. pp 396, with 27 plates. Cambridge University Press, 1978. £27.50 hardback; £7.95 soft cover

The plants which inhabit our streams and rivers have received scant attention when compared with other groups of higher plants in the British flora. Dr Haslam's book goes a long way towards redressing this neglect.

One is first struck by the extravagant page format of which the margin comprises one-third, and by the extensive and innovative use of graphics. Line drawings are used to portray the habit of those species discussed and a convention of symbols has been adopted which, used in conjunction with the latin names of the plants, serve to associate name with illustration. These symbols are also used as a nomenclatural shorthand to represent community composition at different sites in maps of various river systems — one of these is the R Derwent.

The book has three sections. The first relates the occurrence of a wide selection of watercourse species to habitat factors. Components of stream morphology — flow characteristics, substrate type, channel dimensions, and slope — light regime and nutrient status are discussed in relation to species 'preferences'. The second section deals with the vegetation of watercourses and discusses how these assemblages of species change in passing from upland to lowland sections of a river and in passing from hard to soft rock districts. In two chapters allocated to North American watercourses, some interesting points of difference between these and British streams and their plants are brought to the reader's attention. The final section amounts to consideration of river plants in relation to man's use and management of watercourses. The effects of water table manipulation, flood control practices and pollution on watercourse vegetation are briefly reviewed. This section, especially the pollution aspect, could be usefully expanded if another edition is contemplated.

Botanically inclined naturalists will find this book interesting reading but one would like to have seen a selection of bryophytes included. This would have dismissed the impression of emphasis on lowland stream botany and given more substance to the discussion of upland streams. Minor criticisms aside, the author and publishers are to be commended for producing an account which is lucid, decorative and moderately priced.

PJS

The Gardens of Britain. 5 Yorkshire and Humberside by **Kenneth Lemmon**. pp 207, plus 4 pages of coloured and 16 pages of monochrome plates; **6 Derbyshire, Leicestershire, Lincolnshire, Northamptonshire and Nottinghamshire** by **John Anthony**. pp 175, plus 4 pages of coloured and 16 pages of monochrome plates. Batsford/Royal Horticultural Society, 1979. £6.50 each

The two most recent additions to an important new series of books aimed at covering the salient features of the major gardens of Britain on a regional basis. All gardens and parks regularly open to the public are covered in a most informative manner. Although entries are concisely presented, nothing of importance appears to have been overlooked; the reviewer has been able to put them to the test on several occasions recently and has been unable to fault them. The text is well supported by maps, plans and well-chosen photographic plates. Future volumes are awaited with eager anticipation.

VAH

Atlas of Ferns of the British Isles edited by **A C Jermy**, **H R Arnold**, **L Farrell**, and **F H Perring**. pp 101, Botanical Society of the British Isles/British Pteridological Society, 1978. £2.50

Ninety-five maps showing past and present distribution of 8 clubmosses, 3 quillworts, 15 horsetails, Pillwort, Moonwort, *Azolla*, 2 Adder's-tongues and 75 ferns (several maps showing the distribution of more than one species). Each map is accompanied by rubric (mainly ecological), and taxonomic notes for the identification of the *Dryopteris filix-mas* complex and the subspecies of *Asplenium trichomanes* in Britain are also provided. The *Atlas* is very well produced, but unfortunately the format of the maps is not wholly compatible with the overlays published separately by Monks Wood.

Rock and Mineral Collecting in Britain by **P R Rodgers**. pp 166, Faber & Faber, 1979. £3.50

This publication concentrates on indicating the areas of Great Britain and Ireland where gemstones, mineral specimens and fossils are to be found. There is a short introduction, in which the major classes of rock and geological periods are outlined. The book then deals with minerals associated with igneous rocks, fossils, sedimentary minerals, and minerals of metamorphic areas. In each section various localities are mentioned where specified specimens may be found.

There is a brief section on identifying minerals, a mineral catalogue and a useful list of mineral localities with six-figure grid references. There are forty-four figures, photographs, diagrams, and maps. Though the author writes with enthusiasm and has a chatty style there is a general lack of detail and the whole book is at an elementary level. Though it may stimulate an interest in those with no previous knowledge of geology or minerals it is not likely to be useful to the keen amateur or professional geologist.

DEC

Fossils by **David Dineley**. pp 176 (including numerous text figures and maps) plus 16 plates. Collins, 1979. £3.50 paperback; £6.95 hardback

This small volume, the seventh in the Collins Countryside series, maintains the high standards set by the other volumes and has the same practical plastic-coated cover. The work provides a clear account of the process of fossilization, types of fossils and outlines the evolution of life on earth. It is abundantly illustrated with clean line drawings, tables, maps and well chosen plates. There is a helpful reading list and an appendix on how to find literature relating to the fossiliferous localities of Britain, which should be of considerable value to newcomers who wish to make their own collections.

The book adopts an ecological approach and concentrates on fossil groups associated with major environments. Though the work is not a textbook on palaeontology it is authoritative and incorporates recent concepts such as the relationship between continental drift and diversity. It should prove helpful to students of O- and A-level geology and will be of interest and value to geographers, natural historians, environmental scientists, and others who take an active interest in the fossiliferous rocks of the British Isles.

DEC

A Key to the Nymphs of the British Species of Ephemeroptera with Notes on their Ecology by **T T Macan**. pp 80, with 29 text figures. Scientific Publication No 20, Freshwater Biological Association, The Ferry House, Ambleside, Cumbria LA22 0LP. 3rd edition, 1979. £1.80 paperback.

The latest edition of this most useful work has several modifications to the key; there are also a few name changes, and the sections on life-histories and distribution have been rewritten.

Calcium Regulation in Sub-Mammalian Vertebrates by **Christopher G Dacke**. pp xv + 222, including 61 text figures and 34 tables. Academic Press, London, 1979. £15.20

Authoritative review of the progress in research into calcium regulation in vertebrates with particular emphasis on the sub-mammalian classes, dealing specifically with such regulation and its evolution in early vertebrates, and with its importance on a class-by-class basis.

Creative Techniques in Nature Photography by **Arnold Wilson**. pp 192, including numerous photographic plates (8 in colour) and line drawings. Batsford, 1979. £7.50

A lucid account of most aspects of nature photography for the naturalist, biologist and photographer. Topics covered include choice of camera, additional equipment, and micro- and macro-photography of a wide range of plant and animal groups, with emphasis being paid to field, laboratory and studio techniques. The author, a lecturer at Leeds Polytechnic, is to be congratulated for a book which covers such a wide range of organisms in a pleasing and informative manner.

The End of the Game by **Peter H Beard**. pp 280, with numerous black and white photographs. Collins, 1978. £10

This is an interesting and readable account of the history of man, particularly white man, and his impact on the larger animals of Kenya. The first two chapters are devoted to the early exploration of Kenya, the discovery of Mount Kenya, the lives of the early settlers and the construction of the railway from the coast of the Indian Ocean to Lake Victoria. The third chapter takes us to the relatively recent past and talks of the author's safari to northern Kenya in 1960. Throughout this account constant reference is made to the status of wildlife; game control activities are elaborated upon and in chapter five the author traces the history of hunting for sport. To reinforce the present dilemma confronting African wildlife the final chapter is devoted to 39 pages containing 166 photographs of the carcasses, bones and bodies of elephants. There is no text in this final chapter.

The author is forcefully arguing the case of a steady deterioration in the treatment man has accorded to the large animals of East Africa. The account is both emotive and evocative. While thoroughly enjoying the account I did not find the arguments entirely convincing as the various threads developed were not really brought together. Nor was full account taken of the various historical and contemporary social, economic and biological factors that have brought the present state of affairs about.

To the reader who is not acquainted with Kenya the numerous localities, tribes and individuals mentioned must be perplexing; a few maps would undoubtedly have helped.

MJD

Esturine Interactions edited by **Martin L Wiley**. pp xv + 603. Academic Press, New York, 1978. £32

This volume contains 35 papers presented at the 4th Biannual International Esturine research conference held at Pocono, Pennsylvania in 1977. All seventy-two contributors were from the USA and all the papers relate to work undertaken in the coastal waters of the United States with the exception of one which considers the dynamics of mollusc populations in Jamaica and Florida. The papers are primarily a review of contemporary research work and cover a wide range of topics ranging from nutrient cycling and agriculture potential of estuaries to sediment stability and the effects of oil exploration and production. The volume contains a wealth of detailed data about specific localities and there are over 1000 references to recent work. Papers are grouped in eight sections dealing with the impact of man on estuaries, management needs, productivity, organic communities, land estuary interactions, freshwater effects, pollutant cycling, and coastal water influences. Parts of the collection would be of interest to sedimentologists, physical geographers, microbiologists, ecologists, persons concerned with environmental protection and management, and all who have an interest in understanding more about the structure, function and the complexity of the interactions which occur within estuaries.

DEC

Also received:

Nature in Cities. The Natural Environment in the Design and Development of Urban Green Space edited by **Ian C Laurie**. pp xix + 428, including numerous text figures, maps and plates. Wiley, Chichester, 1979. £17.50

Important contributions by international landscape designers, biologists and urban planners on the relationships of the natural and man-made environments of cities; ecological, planning, management, and philosophical aspects are covered in a pleasing and informative manner.

Nuttall's Botanical Names by **Edward Sandford**. pp 64. Warne, 1979. 50p paperback
An easy reference guide with Botanical-English and English-Botanical lists to most outdoor (and a few greenhouse) plants to be found in British gardens and parks.

Garden Britain compiled by **Paul Miles**. Full colour map with notes, plates and index, enclosed in protective plastic wallet. Royal Automobile Club/Map Productions Limited, 27a Floral Street, London WC2E 9LP. 1979. £1.25
Compact and visually attractive map incorporating detailed information on 350 gardens in England, Wales and Scotland.

British Mosses and Liverworts by **E V Watson**. pp xvi + 495, with 242 text figures and 18 plates. Cambridge University Press, 1978. £9.95 paperback
Paperback reprint of the second edition of Watson's standard introductory handbook on bryology for amateur, undergraduate and senior school use; unfortunately the high price will deter many who might otherwise have been attracted to this fascinating subject.

Collins Field Guide to Archaeology in Britain by **Eric S Wood**. pp 383, with 189 maps and line drawings in the text, plus 32 pages of black and white photographs. Collins, 1979. £6.50
Fifth, extensively revised edition of this invaluable reference work for all those interested in our country's heritage — keep readily to hand in the car or rucksack.

British and Other Phoronids by **C C Emig**. pp 57, including 16 figures and 5 maps. Synopses of the British Fauna no 13. Linnean Society of London/Academic Press, 1979. £2.80 limp covers.
Keys and notes for the identification of a little-known group of benthic marine invertebrates.

Modern Biology Made Simple by **Robert Barrass**. pp xiii + 304, including 166 text figures. W H Allen, 1979. £2.25 paperback.
A balanced and up-to-date introduction to the study of biology, which assumes no previous knowledge of the subject, and would provide a most useful text for use in the secondary school.

A Guide to the West Highland Way by **Tom Hunter**. pp 187, including numerous plates and maps. Constable, 1979. £3.50
A further excellent addition to the Constable Guides, providing valuable information for walkers in one of the most beautiful areas of the British Isles, including useful hints on long-distance walking.

Scarborough Field Naturalists' Society Annual Report edited by **F J Thompson**. pp 85. 1977. Obtainable from Mr C I Massey, Woodend Museum, The Crescent, Scarborough; price 85p, including postage.

Notice to Contributors to the 'Naturalist'

Manuscripts (two copies if possible), typed double-spaced on one side of the paper only with margins at top and left-hand at least 2.5 cm wide, should be submitted. Latin names of genera and species, but nothing else, should be underlined. S.I. Units should be used wherever possible. Authors must ensure that their references are accurately cited, and that the titles of the journals are correctly abbreviated. Tables and text-figures should be prepared on separate sheets of paper. Drawings and graphs, drawn about twice the linear size they are to appear, should be in jet-black Indian ink, and legends should not be written on the figures.

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THE YORKSHIRE NATURALISTS' UNION

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Separates of the collected instalments which appeared serially in *The Naturalist* (1967-1970) are available from Dr W. A. Sledge, Department of Plant Sciences, University of Leeds, Leeds 2. Price 50p plus 10p postage.

Y.N.U. NEWSLETTER

The Y.N.U. Newsletter, sent to all Full members and Affiliated Societies, is published twice a year: May and September. Its aim is to provide a means of intercommunication between all members by giving, for example, reports on Y.N.U. and Society meetings and activities, items of broad Natural History interest, details of types of surveys and enquiries. All items should be sent to the Newsletter Editor: Mr H. T. James, 238 Sigston Road, Beverley, Yorks.

LECTURING SERVICE

The Yorkshire Naturalists' Union maintains a list of speakers willing to lecture on a variety of natural history subjects. Secretaries of Affiliated Societies and similar bodies should apply to the Administrative Office, Mr D. Bramley, c/o Doncaster Museum, Chequer Road, Doncaster DN1 2AE for further details of this service.

A REQUEST

It is proposed to start an album of photographs of interest to the Y.N.U. We would be very glad to receive prints of people or events either as a gift or on loan for copying, with dates and as much information as possible. We hope the collection will stretch from the early years of the Union to the present day and become part of the Y.N.U. Archives.

Please send to Mrs J. E. Duncan, 23 Rupert Road, Ilkley LS29 0AQ.

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Doncaster DN1 2AE

MEDITERRANEAN GULLS IN YORKSHIRE

R H APPLEBY and D J BRITTON

Introduction

Prior to 1940, there were only four acceptable records of Mediterranean Gull *(Larus melanocephalus)* in Britain, the species being virtually confined to Turkey, Greece and the Black Sea with sporadic breeding in the Netherlands during the 1930s. By 1960, between ten and twenty were occurring annually in Britain, and in 1964 over forty were recorded (Sharrock, 1974). The increase in both range and number has continued but no analysis of the species' status in Britain has been published for the years subsequent to 1967.

Despite this increase, Voous (1960) suggested that it now possesses only a very limited distribution range with an unmistakable relic character and is probably in the course of becoming completely extinct'. Voous had been misled by an isolated misidentified specimen collected from Inner Mongolia in 1929 which had been named *L m relictus*, giving something of a relic flavour to the distribution map of the species (Vaurie, 1965). The colonization of many European countries in recent years, including southern England in 1968, is indicative of a healthy expansion rather than a drift to extinction.

Status in Yorkshire

The first Yorkshire record (the second British) is given by Nelson (1907) as an adult in winter plumage, obtained on the Yorkshire coast in November 1895'. Unfortunately, Nelson was not given permission by the owner of the specimen to divulge any further information and the statement in the 1975 YNU Ornithological report, that this bird was obtained at Whitby, cannot be substantiated.

Thereafter, Yorkshire remained unaffected by the general increase until 12 October 1958, when a second-year bird was seen from a fishing coble five miles off Scarborough. One or two were recorded in ten of the next fourteen years with five in 1969 and three in 1972. Significant increases to six birds in 1973 and seven in 1974 were followed by much larger increases to twenty-six birds in 1975 and thirty-two in 1976, each of these years producing more Mediterranean Gulls in the county than the twenty-two birds recorded for all years up to 1972. All the Yorkshire records, 1895 to 1977, are listed in Table 1 and Appendix A. The old Yorkshire boundaries, which applied prior to the local government reorganization of 1974, have been used throughout this paper.

Factors Influencing the Expansion

The decrease to seventeen birds in 1977 suggests unusual influxes in the two previous years. The main migratory movements of Mediterranean Gulls are in an east — west direction and the almost continual easterly high pressure systems that occurred over Europe and Asia during the summer of 1975 were conducive to such an influx of eastern species. The autumn of 1975 was, not surprisingly, the best yet recorded for eastern rarities (Dymond, 1976). High pressure areas over Scandinavia and Germany in June 1976 produced sweeping hot dry air across the British Isles followed by an exceptionally long, hot and dry summer. The autumn of 1976 saw the best seabird-watching on the east coast for many years including an unprecedented number of Cory's Shearwaters, *Calonectris diomedea* (O'Sullivan, 1977). Thus, these two years were exceptional both meteorologically and ornithologically, and although the 1977 total was by previous standards a high one, it might be several years before the 1976 total is eclipsed.

The unusual weather in 1975 and 1976 may explain these influxes but it does not account for the general expansion of the species in Britain and Europe. The populations of other gulls in Britain have grown steadily during recent decades and whilst this may have been due to the activities of man, resulting in increased availability of food supplies, Harris (1970) has

TABLE 1
The number of Mediterranean Gulls *(Larus melanocephalus)* recorded in Yorkshire during the period 1895–1977

Year	Number	Year	Number
1895	1	1968	1
1958	1	1969	5
1959	1	1970	2
1960	2	1971	0
1961	0	1972	3
1962	1	1973	6
1963	1	1974	7
1964	0	1975	26
1965	2	1976	32
1966	0	1977	17
1967	2	Total	110

pointed out that there is little quantifiable evidence to support this view. Nevertheless, sewer outlets are undoubtedly very attractive to gulls, and many of the Mediterranean Gulls at Scalby Mills have been seen feeding at the sewer outlets in Jackson's Bay. Such behaviour has also been noted at Redcar and Bridlington. Elsewhere in Britain, the species has been observed using other man-made sources of food, including rubbish dumps, fish quays and power station cooling system outlets, but such activities have not yet been reported in Yorkshire.

In southern Europe, the increase in tourism has resulted in sewerage being pumped into the Mediterranean Sea at a greatly increased rate and as this is the main wintering area of the species, this could well have influenced the growth in population.

Ages

Mediterranean Gulls have three recognizable age plumages. First-year birds are the most likely to be overlooked, superficially resembling Common Gulls *(L canus)* of the same age (Grant and Scott, 1967; Hume and Lansdown, 1974). Second-year plumage is acquired after a complete moult in the second autumn; it resembles that of adults but there are a variable number of black spots or bands at, or near, the primary tips. Adult plumage is assumed at the end of the third autumn, after another complete moult, and is strikingly pale with very pale grey mantle and wings grading to white flight feathers. At all ages the heavy bill, with a pronounced gonys and fierce head are distinct. The size and wing shape are between those of Common Gull and Black-headed Gull *(L ridibundus)* and at rest the legs are noticeably longer than those of Black-headed Gull. A black hood is acquired in spring by second-year and adult birds following a moult of the head and body.

TABLE 2
The age distribution of Mediterranean Gulls *(Larus melanocephalus)* recorded in Yorkshire

	Up to 1974	1975–77	All years
Adult	21 (60%)	27 (36%)	48 (44%)
Second-year	9 (26 %)	20 (27%)	29 (26%)
First-year	5 (14%)	28 (37%)	33 (30%)
All birds	35	75	110

Two juveniles (1975 and 1976) are included as first-year birds.

Sharrock (1974) showed that an excessive proportion of Mediterranean Gulls reported in Britain were adults (80 per cent between 1958 and 1962), probably because many immatures were overlooked. It is also likely that some second-year birds were identified as adults; the first Yorkshire record is given by Nelson (1907) as an adult, but the photograph of the specimen is clearly of a second-year bird. The proportion of adults in Britain reduced to 66 per cent during 1963–67, probably reflecting increased observer experience. Only 33 per cent of the Swansea birds analysed by Hume and Lansdown (1974) were adults.

In Yorkshire, 60 per cent of the Mediterranean Gulls prior to 1975 were adults but the proportion reduced to 36 per cent during 1975–77, agreeing closely with the Swansea situation. Possibly of more significance in terms of observer competence, the number of first-year birds increased from 14 per cent prior to 1975 to 37 per cent during 1975–77 (see Table 2). The appearance of juveniles at Scarborough on 17 August 1975 and at Blackmoorfoot Reservoir on 2 September 1976 is suggestive of local breeding but according to Géroudet (1965), juveniles ringed on the island of Orlov in the Black Sea disperse rapidly and reach the English Channel from July onwards. Nevertheless, the inland juvenile is of particular interest.

Individual Identification

The three age plumages are convenient for separating individuals. The wing and tail patterns of first-year birds vary. Second-year birds have a variable number of black primary spots or bands (1 to 5, usually 3 or 4). Birds of similar age can often be distinguished by variations in the bill colour and pattern and in head pattern. Other features such as the presence of a ring or of a recognizable injury have also been useful. A single observer who records details of all Mediterranean Gulls seen in one area is generally able to recognize individuals using a combination of all these factors, but it is more difficult to separate birds seen by different observers. In the absence of evidence clearly indicating more than one bird, two records at the same locality of birds of the same age are taken to be the same individual if the dates are within about two months of each other. For this purpose, the Redcar area, the Scarborough area and Flamborough Head/Bridlington area are each regarded as single localities.

Wandering and Returning Individuals

No attempt has been made to correlate records from different localities. Thus a wandering bird could boost the total by being sighted at more than one place. There is also the problem of one bird reappearing at the same locality during a succession of winters. There are several instances of this in Britain, eg at Hartlepool (Co Durham), St Ives (Cornwall) and Covehithe (Suffolk). These birds were generally present for several months each winter, and in the case of the Hartlepool bird for fifteen successive winters. None of the Yorkshire birds precisely fitted this pattern, but the series of adults at different sites during the 1960s could have been due to one bird returning and wandering. However, if returning birds were a significant problem the proportion of adults would have been much greater than the 36 per cent recorded in 1975–77.

Undoubtedly, some individuals have been counted more than once but others have been lost by being lumped together because insufficient details were recorded, particularly at Spurn and Flamborough Head where most birds were seen on passage.

Date of Arrival

The dates when individuals arrived are analysed by ten-day periods in Fig 1. Sharrock (1974) found a distinct arrival throughout July and reaching a peak in August, probably continuing throughout August, September and October and possibly even into November. There is also a smaller peak of new records in mid-April. The Yorkshire records support this interpretation fairly closely except that the peaks are both rather earlier (late July and late March) and the spring influx is more pronounced than that of the autumn. The autumn peak clearly extends into November. Very few birds arrived between the middle of April and the end of June.

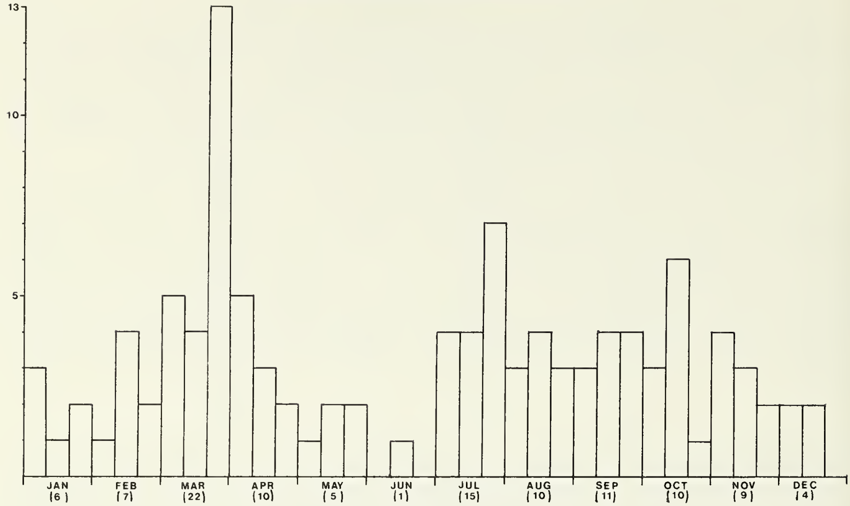

FIGURE 1
The number of Mediterranean Gulls *(Larus melanocephalus)* arriving in each ten-day period. Each month is divided into three periods: the first ten days, the next ten days and the remainder of the month. The number in parentheses beneath each month is the total number of birds arriving during that month

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Favoured Haunts

The most favoured localities were Scarborough (37 birds), Redcar (20), Spurn (20), and Flamborough Head/Bridlington (12). Most of the Scarborough birds were seen at Scalby Mills and Jackson's Bay, an area that is now undoubtedly the best haunt in the county for the rarer gulls and one of the few places in Britain where six Mediterranean Gulls have occurred in a day (28 and 31 March 1976). Jackson's Bay, which stretches northwards from Scalby Mills, is included in Appendix A as Scalby Mills.

The Redcar birds visited the town beach (13 birds), Coatham Marsh (7) and South Gare (6) — some individuals having been seen at more than one of these places. Spurn had ten of the twenty-two individuals recorded in Yorkshire up to 1972 (45 per cent) but only 11 per cent in more recent years. In contrast, Flamborough Head/Bridlington had none up to 1972 but more than Spurn between 1973 and 1977.

Inland gull watching is also beginning to have interesting results. Following the first bird at Blackmoorfoot Reservoir in 1975, seven individuals have now been seen in the Calder and Aire Valleys and it is probable that the absence of past records was due to a lack of observation rather than to a lack of Mediterranean Gulls. Fig 2 shows the approximate position of localities at which Mediterranean Gulls have been recorded in Yorkshire.

Association with Other Gulls

Almost all the Mediterranean Gulls were seen with other small gulls, mainly the closely related Black-headed Gull with which hybridization has occurred in Hampshire (Taverner, 1970). Association is occasionally recorded with other species, but at Scarborough birds are frequently seen in company with Kittiwakes *(Rissa tridactyla)* which are normally present in

some numbers. This apparently unusual phenomenon may have been rarely recorded elsewhere simply because Kittiwakes are uncommon at more southerly Mediterranean Gull sites in Britain and Europe.

It is probable that regular scrutiny of flocks of small gulls, particularly Black-headed Gulls, anywhere on the Yorkshire coast, or even inland, would reward the patient observer with an occasional Mediterranean Gull.

1975 Scarborough Birds

The 1975 Scarborough records were analysed by Appleby (1975). The letters used there are included in Appendix A to allow cross reference. A re-examination of those records has resulted in fourteen birds. The opportunity is taken here to correct the letters against the sketches on page 66 of the 1975 YNU Ornithological Report which should have been, in relation to the text, B, A, D, E, F rather than A to E respectively.

Source of Records

Records have been extracted from YNU files and, for the Redcar area since 1974, from the personal files of DJB.

Summary

The status of the Mediterranean Gull in Yorkshire up to 1977 is reviewed. Following the first bird in 1895, there were no further records until 1958. One or two, occasionally more, were recorded in most years up to 1972. Significant increases to six birds in 1973 and seven in 1974

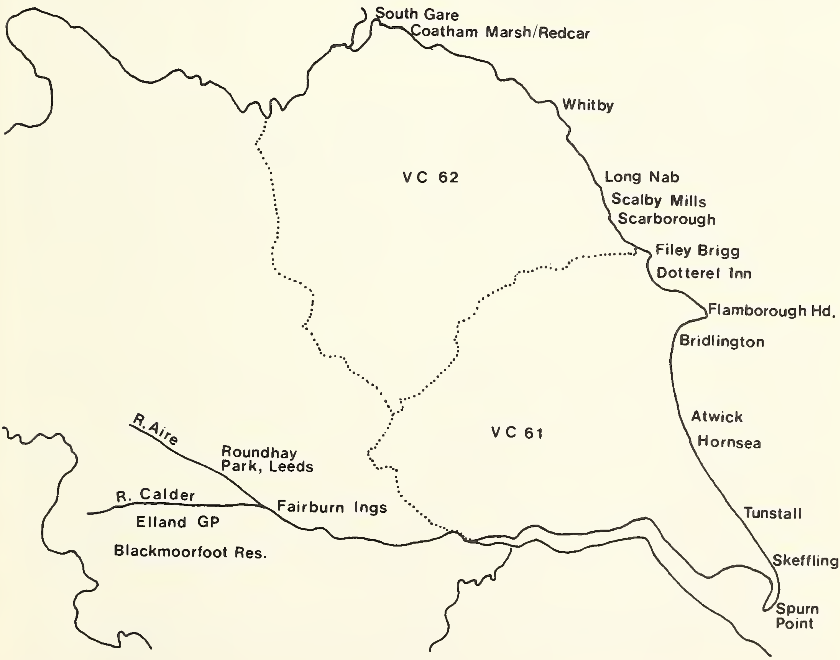

FIGURE 2
Map of Yorkshire (pre-1974 boundaries) indicating approximate position of localities at which Mediterranean Gulls *(Larus melanocephalus)* have been recorded

were followed by influxes of twenty-six and thirty-two birds in 1975 and 1976 respectively, numbers decreasing to seventeen in 1977. There have now been 110 birds.

The proportion of adults has decreased from 60 per cent in earlier years to 36 per cent during 1975 to 1977, probably indicating increased observer experience. The ageing and recognition of individual birds and the possibility of wandering or returning individuals confusing the situation are discussed. There were peak arrival periods in late March and late July, corresponding to, but rather earlier than, similar peaks found by Sharrock (1974) for the 1958–67 British records. The most favoured localities were Scalby Mills, Spurn and Redcar. Spurn had nearly half the records up to 1972 but only a small proportion in more recent years. Seven birds have been seen in the Calder and Aire valleys since Yorkshire's first inland record in 1975. Association is mainly with Black-headed Gulls but at Scarborough is often with Kittiwakes. Reasons for the general increase are suggested.

Observers

The following observers' initials appear in Appendix A. Some birds were reported by many other observers, too numerous to be included in Appendix A. R H Appleby, G Beck, G R Bennett, P Bray, D J Britton, C R Clarke, T M Clegg, B Cockerill, W F Curtis, J E Dale, J M Dale, M Densley, M L Denton, H Dillingham, P M Ellis, G W Follows, I Forsyth, B Foster, D I Fotherby, M Francis, T Francis, M Gee, A Grieve, D Grundy, the late K Hardcastle, R G Hawley, M Hodgson, M A Hollingworth, N Jackson, S L James, C D King, P D Kirk, P A Lassey, M Limbert, S M Lister, S C Madge, J R Mather, H Mitchell, D E Murray, G R Naylor, E C Parker, B E Prater, J Rawcliffe, I Smith, F J Thompson, D I M Wallace, A J Wallis, J Whitehead, F A Whitford, C Winn, P H G Wolstenholme, Spurn Bird Observatory.

Acknowledgements

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APPENDIX A

Mediterranean Gulls *Larus melanocephalus* in Yorkshire 1895 to 1977. Individuals are numbered for reference. Other records may have been additional birds but seem likely to have been the individual whose number is given in brackets. The birds are listed in chronological order up to 1974 but are separated into major areas within each year from 1975 to 1977.

1. Second-year obtained on Yorkshire coast in November 1895 (Per Nelson)
2. Second-year five miles off Scarborough on 12 October 1958 (JRM, KH, CW, *et al*)
3. Adult at Spurn on 2 May 1959 (KH, CW)
4. Adult at Scarborough on 30 January 1960 (TMC)
5. First-year at Atwick on 16 October 1960 (GRB)
6. Adult at Spurn on 21 October 1962 (MD, PHGW, GRN, *et al*)
7. Adult at Spurn on 9 November 1963 (SBO)
8. Adult at Scalby Mills 21 March to 14 May 1965 (RHA, AJW, DIF)
9. First-year at Scarborough on 30 August 1965 (TMC)
10. Adult at Spurn on 21 July 1967 (SBO)
11. Adult at Spurn on 18 October 1967 (SBO)
12. First-year at Spurn on 23 July 1968 (SBO)
13. Adult at Filey Brigg on 1 March 1969 (RHA, FJT, *et al*)
14. Adult at Hornsea on 13 July 1969 (MH)
15. Adult at Spurn on 12 August 1969 (SBO)
16. Adult at Scarborough on 1 October 1969 (AJW)
17. Adult at Spurn on 9 November 1969 (SBO)
18. Adult at South Gare on 1 March 1970 (HM, NJ)
19. First-year at Hornsea Mere on 15 and 16 October 1970 (WFC)
20. Adult at Spurn on 13 August 1972 (SBO)
21. Second-year at Hornsea on 26 August 1972 (WFC)
22. First-year at Spurn on 1 October 1972 (SBO)

1973

23. Adult at Spurn on 1 April (SBO)
24. Second-year at Bridlington on 19 May (PME)
25. Adult at Hornsea on 9 August (WFC)
26. Adult at Spurn on 30 September (SBO)

(26) Adult at Spurn on 13 October (SBO)

27. Second-year at Jackson's Bay on 14 October (DIF)
28. Second-year at Scalby Mills on 3 November (RHA, BC)

(26) Adult at Spurn on 10 November (SBO)

1974

29. Adult at Redcar on 9 March (DJB)
30. Adult at Jackson's Bay on 24 March (DIF)
31. Second-year at South Gare on 29 March (DJB)
32. Adult at Tunstall on 31 March (DEM)
33. Second-year at Scalby Mills 9 to 21 April (RHA, CRC, *et al*)
34. Second-year at Scalby Mills 11 to 21 April (RHA, CRC, *et al*)
35. Adult at Spurn on 24 July (SBO)

1975 (VC 61)

36. First-year at Filey Brigg on 31 March (JW, IF, JR)
37. First-year at Bridlington 3 to 19 April (SCM, DJB, *et al*)
38. First-year at Spurn on 27 April (SBO)
39. Second-year near Dotterel Inn on 12 June (RHA)
40. Adult at Bridlington 24 to 26 July (SCM)

(40) Adult at Flamborough Head on 17 August (DIMW)

41. Second-year at Flamborough Head on 30 August (DIMW)
42. Adult at Skeffling on 4 September (MAH)
43. Adult at Filey Brigg on 13 September (RHA)

(40) Adult at Flamborough Head on 11 October (PAL, IS)

44. Adult at Spurn on 23 November (SBO)

1975 (VC 62, Scarborough area)

45. Second-year at Scalby Mills on 15 February (RHA, *et al*) (a)
46. First-year at Scalby Mills on 17 February (RHA, *et al*) (b)

47. Adult at Scalby Mills on 8 March (RHA, *et al*) (c)
48. First-year at Scalby Mills 29 March to 30 April (RHA, CRC) (d)
49. First-year at Scalby Mills 29 March to 30 April (RHA, CRC) (e)
50. First-year at Scalby Mills 30 March to 30 April (RHA, CRC) (f)
(47) Adult at Scalby Mills 6 to 10 April (RHA, DJB, TF)
(45) Second-year at Scalby Mills 10 to 17 May (RHA, *et al*)
(48, 49, 50) First-year at Scalby Mills 24 May to 31 July (RHA)
51. Adult at Scalby Mills 31 July to 20 September (RHA) (h)
52. Juvenile at Scarborough Harbour/Scalby Mills 17 and 18 August (CRC) (g)
53. Adult at Scalby Mills 20 September to 12 October (RHA, CRC) (i)
54. Adult at Scalby Mills 20 September to 6 December (RHA, CRC, DJB) (j)
55. Second-year at Scalby Mills on 28 September (RHA) (–)
(55) Second-year at Scalby Mills on 25 October (RHA)
56. First-year at Scalby Mills on 1 November (RHA) (–)
57. First-year at Scalby Mills on 13 December (RHA) (k)
58. First-year at Scalby Mills on 13 December (RHA) (l)

Note The letters in parantheses are those used by Appleby (1975)

1975 (VC 62, Redcar area)

59. First-year at Redcar 17 to 31 July (DJB, *et al*)

1975 (Inland vice-counties)

60. First-year at Blackmoorfoot Res on 4 August (PB) (VC 63)
61. First-year at Fairburn Ings on 10 and 14 September (CW, PDK) (VC 64)

1976 (VC 61)

62. Second-year at Spurn on 24 April (SBO)
63. Second-year at Spurn on 7 August (SBO)
64. Second-year at Flamborough Head on 13 August (PAL, IS, AG)
65. Adult at Flamborough Head on 19 September (DIMW)
66. First-year at Flamborough Head on 24 September (PAL, IS)
(65) Adult at Bridlington on 1 October (PAL, IS)
67. Adult at Bridlington on 1 October (PAL, IS)
(66) First-year at Bridlington on 9 October (PAL)
68. Adult at Spurn on 19 and 21 October (SBO)

1976 (VC 62, Scarborough area)

(54) Adult at Scalby Mills 22 January to 25 April (RHA, MF, *et al*)
69. Second-year at Scalby Mills on 6 February (RHA)
(54) Adult at Long Nab on 7 March (FAW)
70. Adult at Scalby Mills 13 to 28 March (RHA, MF, *et al*)
71. First-year at Scalby Mills 13 March to 1 May (RHA, MF, DJB, *et al*)
72. Second-year at Scalby Mills 13 to 28 March (RHA, MF, FAW)
(69) Second-year at Scalby Mills on 28 March (RHA, MF, FAW)
73. First-year at Scalby Mills 28 March to 1 May (RHA, MF, DJB, *et al*)
74. Adult at Scalby Mills on 31 March (RHA)
75. Adult at Scalby Mills on 31 March (RHA)
76. Second-year at Scalby Mills 31 March to 11 April (RHA, SLJ)
77. Second-year at Scalby Mills 31 March to 1 May (RHA, SCM, DJB, *et al*)
(54) Adult at North Bay, Scarborough on 2 May (RHA)

1976 (VC 62, Redcar area)

78. Second-year at Redcar on 13 February and 14 April (DJB)
79. First-year at Redcar on 8 April (DJB)
(78) Second-year at Coatham Marsh on 12 April (TF)
80. First-year at South Gare on 19 April (DJB, *et al*)
(79, 80) First-year at Redcar 5 to 22 June (DJB)
81. First-year at Redcar on 4 July (DJB)
82. Ringed first-year at Redcar on 4 July, at South Gare on 15 July (DJB)
83. Adult at Redcar on 8 July (DJB)
84. Second-year at South Gare 10 to 22 July (BEP, DJB)
85. First-year at Redcar on 12 July (DJB)
86. First-year at Redcar on 12 July (DJB)
87. Adult at South Gare on 25 September (GWF)
88. Runt adult at Coatham Marsh 27 November 76 to 13 February 77 (DJB)
(87) Adult at Coatham Marsh on 27 and 28 November (DJB, MG)
89. Second-year at Coatham Marsh on 4 December (DJB)

1976 (Inland vice-counties)

90. First-year at Roundhay Park, Leeds on 5 January (HD) (VC 64)
91. First-year at Elland GP, River Calder on 31 January (JED) (VC 63)
92. First-year at Fairburn Ings on 31 May (SCM) (VC 64)
93. Juvenile at Blackmoorfoot Res on 2 September (PB, MLD) (VC 63)

1977 (VC 61)

94. Second-year at Hornsea on 23 and 25 February (RGH, SML)
95. Adult at Spurn on 5 March (SBO)
96. Adult at Flamborough Head on 20 March and 9 April (DIMW, PAL, IS)
97. Adult at Flamborough Head on 17 April (PAL, IS)
98. Second-year at Flamborough Head on 15 May (PAL, IS)
99. Adult at Spurn on 28 May (SBO)

(96) Adult at Flamborough Head on 5 June (PAL, IS)

100. Adult at Flamborough Head on 13 November (DIMW)
101. Adult at Hornsea Mere on 19 November (RGH)

1977 (VC 62, Scarborough area)

102. Adult at Scalby Mills on 2 January (BEP)

(102) Adult at Scalby Mills on 19 February (ML)

103. First-year at Scalby Mills 8 to 12 January (RHA, MF)
104. Second-year at Scalby Mills on 16 January and 9 February (RHA, JMD)
105. Adult at Long Nab on 30 July (MF)

(105) Adult at Scalby Mills 20 August to 2 October (RHA)

1977 (VC 62, Redcar area)

(87) Adult at Coatham Marsh on 3 and 9 January (ECP, GB)

(89, 106) Second-year at South Gare on 12 February (GWF)

106. Ringed second-year at Coatham Marsh on 13 February (DJB)

(89, 106) Two second-years at Redcar on 26 March (DG)

107. Second-year at Coatham Marsh 2 to 5 April (DJB, BF, GB)
108. Adult at Coatham Marsh on 31 July (DJB, BEP, GWF)
109. Adult at Redcar on 6 December (CDK)

1977 (Inland vice-counties)

110. Second-year at Blackmoorfoot Res on 28 February (PB, MLD) (VC 63)

ATTEMPTED BREEDING OF LITTLE GULLS IN YORKSHIRE

S C MADGE

RSPB Warden, Fairburn Ings

Single adults and, more rarely, pairs of Little Gulls *Larus minutus* have been recorded in attendance at breeding colonies of Black-headed Gulls *L. ridibundus* in Britain on several occasions in recent years (Hutchinson and Neath, 1978). On one occasion there was a breeding attempt when a nest was built and eggs laid amongst Black-headed Gulls on the Ouse Washes, Cambridgeshire/Norfolk in 1975. Failure was due to predation, possibly by Brown Rats *Rattus norvegicus* which killed the sitting bird (Carson *et al*, 1977). In 1978 breeding was attempted at the Royal Society for the Protection of Birds reserve at Fairburn Ings, North Yorkshire and is detailed in this paper.

1978 Breeding Attempt

On the evening of 27 May a party of three Little Gulls, two adults and a first-summer bird, were located at the western end of the reserve at Newton Ings. During the following afternoon they appeared about the Village Bay area, some three kilometres east of their original appearance and alighted on the island below Fairburn village where a colony of 100–150 pairs of Black-headed Gulls was established. The first-summer bird showed only a passing

interest in the gull colony and soon moved back to the western part of the reserve where it stayed until 16 July. The two adults however, remained about the island for the next few days and speculation grew as their interest in the gull colony became more apparent. They were often noted flying about over the island calling excitedly, 'kek-kek-kek'. Between them they ensured that one was always present at a site near the edge of the colony, close to a wet area in the centre of the island.

On the evening of 3 June, an adult was seen to drop onto the site with a piece of dead plant material and building continued throughout the following day. Material was brought in by flight or simply carried to the nest by a walking bird whilst the other remained on site and arranged the material. By the morning of 5 June the nest was more or less complete and on the following morning the sitting bird was seen to stand up and to rearrange something beneath it before shuffling down onto the nest again. Its movements were consistent with the turning of eggs. The non-sitting bird frequently chased off any Black-headed Gulls that wandered too close to the nest and on occasions when its mate was away from the site, the sitting bird reached out and pecked at gulls that wandered too close.

A close watch was kept over the area of the colony for the next few weeks, observations being made from a concealed site through a mounted telescope (20×–60× magnification) at a range of some 200 metres. During the observation period, vegetation on the island grew fairly rapidly, and by the third week of June the nest was almost completely obscured from view although part of the sitting bird could still be seen.

Both birds were often seen well away from the nesting site when off-duty and spent a lot of their off-duty time as far as three kilometres away. Changeover at the nest was most frequently observed between 1600 and 1700 hours BST.

One of the pair, presumed male by the markedly blacker underwings, was almost unconcerned by people and would frequently feed very close to the public footpath by the edge of the lake, sometimes flying between people as they watched it. It even dipped amongst paddling children on occasions, probably feeding on invertebrates being stirred up by their feet. The other bird was far more wary and kept well away from people.

On 25 June, by which time the incubation period would have been nearing completion, only one adult was noted about the colony and this bird was 'loafing' with non-breeding Black-headed Gulls. It made a few brief visits to the nest site but did not stay long. We hoped that this behaviour could be associated with hatching eggs and that the fact that we couldn't see a bird on the nest was due to growth of vegetation obscuring the site. The same situation prevailed on the following two days, during which time the second adult had not been seen at all and we became rather worried.

On the evening of 27 June, the presumed male Little Gull was found injured near the public footpath, some 400 metres from the nest site. The author of this paper, together with C Winn and P Kirk took the injured bird out onto the island and released it there, in the faint hope that the eggs had hatched and that the presence of the missing mate might stimulate the healthy bird into continuing to look after any young that might have hatched. At the same time a brief search was made for the nest, but it was difficult to be certain just where it was amongst the many Black-headed Gull nests. One which we regarded as most likely that of the Little Gulls was empty.

The Presumed Nest

It must be stressed that we were not certain if we had found the actual nest of the pair of Little Gulls, but the smallest of the empty gull nests in the area of the *Glyceria* bed that we had been watching is described.

It lay on an area of flood-flattened *Glyceria maxima* some thirty metres from the edge of the island. Whilst the nest was under construction it was near a wet depression on the island but by the end of June this depression had dried out. The nest itself was constructed of dead stems of various water plants, approximate dimensions being: height, 80 mm; nest diameter, 300 mm; internal cup diameter, 130 mm.

Adult Little Gull at nest, Sweden. Photo: Gösta Håkansson

Factors Affecting the Breeding Attempt

Perhaps one of the most important factors involved in this breeding attempt was the floods that had inundated the reserve during late April and early May. Water levels had risen and completely washed out the first clutches of the Black-headed Gulls nesting on the island. In late May there was much activity within the colony as birds furiously rebuilt nests as the water level dropped. This coincided with the arrival of the Little Gulls which were presumably stimulated into settling down by this activity. Had the Black-headed Gulls already been incubating, the Little Gulls would possibly not have remained, but would have been logged simply as spring passage birds.

There was daily predation of the gull colony by a pair of Carrion Crows *Corvus corone* and immature Lesser Black-backed Gulls *Larus fuscus*. Whilst the mass of the Black-headed Gulls were up in the air harassing marauding gulls or crows, the Little Gulls usually sat tight on the nest site, leaving the mobbing to their larger relatives.

It is worth noting, in view of the oft expressed comment that a Black-headed Gull colony is undesirable, that they in fact create an 'umbrella effect' and consequent protection to other species nesting among or near them. It is known that the pair of Carrion Crows certainly took a good many eggs, including those of Black-headed Gulls since a number of egg shells of various waterbirds were located near a crow's nest in a nearby wood.

During the course of watching over the breeding colony through the Little Gull nesting period, we stopped three groups of youths from attempting to get out to the colony; two groups used air beds, the others waded and swam. Although it is considered that these youths were not specifically interested in the Little Gulls, they would have caused considerable disturbance to breeding birds had they succeeded in getting onto the island.

The adult Little Gull that was eventually found injured was considered to be the male, ie the 'tame' bird. It had been picked up at a spot where loitering youths had been moved away a few days before and it seems highly likely that it had been the victim of a catapult or air-gun user.

It is ironic that after braving natural hazards, such as flooding and predation and despite continual observation of the breeding area, the breeding attempt failure was probably due to an act of vandalism. It seems likely that the sitting bird was forced to leave the nest through hunger after its mate had failed to return to relieve it and that the unattended nest was then predated.

The injured bird was not seen again after its release on the island. Its mate was noted about the reserve until 9 July.

This disastrous ending to what could well have been the first successful breeding of Little Gulls in Britain and Ireland was all the more heart-breaking since the nest and eggs had survived virtually to hatch date.

Other Yorkshire Records of Note

On 17 June 1958 an adult Little Gull was discovered amongst a colony of Black-headed Gulls at Newton on the Fairburn Ings reserve. The bird was watched calling and displaying over the colony and was paying particular attention to a certain area of the marsh. It was seen regularly up until 28 June by when the displaying was less intense. Untimely floods after thunderstorms then washed out the entire Black-headed Gull colony, causing them and the Little Gull to move out (R F Dickens, pers comm).

Another displaying adult was present in a colony of Black-headed Gulls in the Derwent Valley from 14 to 28 May 1966 and single immatures were noted in a colony of the same species at Thorne Moors on 8 June 1969, 6–7 June 1970 and 20 May 1972 (Hutchinson and Neath, 1978; Limbert, 1979).

Summary

Observations on an unsuccessful breeding attempt by a pair of Little Gulls at Fairburn Ings are given, including notes on the nest site, disturbance and predation factors and general behaviour. It is suggested that passage Little Gulls in spring may be attracted by colonies of Black-headed Gulls where these are at a certain stage of breeding activity. Attention is also drawn to other Yorkshire records of the presence of Little Gulls amongst Black-headed Gull colonies which suggests that breeding attempts might be more frequent than records indicate of a species that is probably spreading from eastern Europe.

Acknowledgements

Thanks must go primarily to the voluntary wardens at Fairburn Ings who kept watch over the breeding area concerned during the attempt, with special thanks to Ian Jarvis, Tom Goodwin and Charlie Winn. I am also grateful to Bob Dickens and the Royal Society for the Protection of Birds Reserves Department who commented on and added to the first draft of this paper, and to Gösta Håkansson for permission to use the accompanying photograph.

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THE WHISKERED BAT *(MYOTIS MYSTACINUS)* AND BRANDT'S BAT *(M. BRANDTI)* IN YORKSHIRE — AN HISTORICAL PERSPECTIVE

M. J. A. THOMPSON

Introduction

According to Stebbings 1977 the distribution in Britain of whiskered bats *(Myotis mystacinus* and *M. brandti)* is uncertain due to the recent discovery of the latter species. Until 1970 it was considered that all whiskered bats were a single species, *M. mystacinus*, distributed throughout Europe and much of the Palaearctic. Since the identification of the second species, positive records in Britain for both species have come from southern England and Wales, as well as north to Yorkshire. Although the number of positive identifications for both species is small, there does not appear to be any difference in overall distribution in Britain (Arnold, 1978).

The first record for the whiskered bat in Yorkshire was from Great Mytton, a village just inside the county boundary. Writing in 1881, W. E. Roebuck stated that he had 'the satisfaction of adding this bat to the Yorkshire fauna. M. F. S. Mitchell of Clitheroe having sent me for determination of the specimen at Great Mytton, a small village close to the confluence of the Ribble and the Hodder'. Oxley Grabham of York, writing at the beginning of the twentieth century, describes *M. mystacinus* as a 'local bat, but not rare'. This paper is to show the subsequent recording of these species in Yorkshire.

Historical and Recent Records of *M. Mystacinus (sensu lato)* in Yorkshire

Records from 1881 onwards are listed in Table I. All records are within the pre-1975 local government boundaries for Yorkshire, unless stated otherwise. Both species are combined into one table, because most records could not be checked, unless specimens existed. Positively identified *M. mystacinus* and *M. brandti* are shown in separate tables (Tables II and VI).

Some Biological Data Available from Tables I and II.
(*M. brandti* is dealt with separately)

1. *Distribution and Status*

The distribution map (Fig. 1) shows that most of the records for *M. mystacinus* (sl) are from the centre of the county. A few coastal records were recorded before 1914. As is so often the case with such maps they tend to show the distribution of recorders rather than bats within Yorkshire. Reference to the status of the whiskered bat in Yorkshire has been made by the following authors:

(i) Clarke *et al.* (1886) — referring to Nidderdale — 'this bat is common about here, nearly as common as the pipistrelle and occurs as high up the dale as Lofthouse'. Earlier, Clarke and Roebuck (1884) had stated that 'they considered the whiskered bat to be widely distributed and fairly numerous from within the county'.

(ii) Clegg (1963) — in describing the mammals of the Sheffield area states 'this species, which was recorded at several sites around Barnsley about fifty years ago, may be more widespread than numbers would suggest'.

(iii) Howes (1973) — in his description of the historical records of the Doncaster area and south-east Yorkshire, states that previous local authors had noted that *M. mystacinus* (sl) is 'not common in the district' (B.M. 1935).

(iv) Stebbings (1979) — having located two specimens of *M. mystacinus* and one of *M. brandti* in disused mine tunnels at Scordale, near Warcop in Westmorland, stated that 'this site is definitely in Westmorland (Cumbria), rather than Yorkshire, but at least shows that north-west Yorkshire is likely to contain both species' (pers. comm.).

TABLE I. Historical records of *M. mystacinus* (s.l.)

Locality	Grid Ref. No.	Year(s)	Sex	Authority
Great Mytton	37/71-39-	1881		Roebuck W. E.
Pateley Bridge	44/15-65-	1881		Storey W.
Harrogate	44/3--5--	1881		Grainger J.
Evestone	44/22-68-	1881–83		Ingleby T.
Ben Rhydding	44/13-47-	1881–83		Firth J.
Harrogate	44/3--5--	1884		Grainger J.
Masham	44/22-80-	1884/1904		Carter T./Grabham O.
Warsill	44/23-65-	1884		Ingleby J.
Nidderdale	44/1--6--	1886		Thackrey W.
Lofthouse	44/10-73-	1886		Storey W.
Glasshouses	44/17-64-	1886		Storey W.
Bingley	44/10-39-	1889		Booth H. B.
Willerby	54/00-79-	1889		Clarke W. E.
Grassington	44/00-64-	1891		Grabham O.
Staxton	54/01-79-	1891		Head C. D.
Scarborough	54/0--8--	1892		Head C. D.
Ingleby Greenhow	45/59-06-	1892	♂	Waite E. R.
Pocklington	44/80-49-	1894		Gerrard J.
Welwick	54/34-21-	1898		Grabham O.
Flaxton	44/68-62-	1899		Grabham O.
Washburn Valley	44/1--5--	1899		Grabham O.
Rockley Abbey	44/33-01-	1900		Armitage J.
Park Road, Barnsley	44/3--0--	1900		Armitage J.
Worsborough Reservoir	44/34-03-	1901		No author/Sheffield Museum
Stainborough	44/31-03-	1901		Armitage J.
Scarborough	54/0--8--	1903		Rimmington F. C.
Worsborough Bridge	44/35-03-	1905		Whittaker A.
Victoria Park, Keighley	44/06-41-	1908	♂ Juv.	Hazelwood E.
Wet Ings Bridge, Halifax	44/0--2--	1908		Morley I.
Skipton	34/9--5--	1911		No author/B.R.C. record
Hornsea Mere	54/19-47-	1912		Bolam G./Booth H. B.
Cold Hiendley	44/36-14-	1915		Pollard M.
Burley-in-Wharfedale	45/15-46-	1916		Bolam G.
Parkhead, Sheffield	43/32-83-	1919		Clegg T. M./Sheffield Museum
Appleby, Westmorland	35/6--2--	1921	♀	Booth H. B.
Scarborough	54/03-86-	1924		Clarke W. J.
Duncombe Park, Helmsley	44/60-83-	1926	♂	Gordon A.
Helmsley	44/61-83-	1928	♀	Gordon A.
Helmsley	44/61-83-	1935	♂	Gordon A.
Doncaster	44/5--0--	1935		Howes C. A./Doncaster Museum
York	44/6--5--	1940		Taylor W. E.
York	44/5--5--	1945		Taylor W. E.
Scarborough Mere	54/03-86-	1950		Gilmore E. F.
Helmsley	44/61-83-	1951		Gordon A.
Rotherham	44/40-99-	1952		Bramhill R.
Sheffield	43/3--8--	1963		Clegg T. M.
Hebden Bridge	35/9--2--	1965		Morley I.
Leeds	44/2--3--	1972		No author/Sheffield Museum
Rowntrees Factory, York	44/60-53-	1973	♂	Thompson M. J. A.
Wakefield	44/3--2--	1974	♂	Cameron J./Thompson M. J. A.

TABLE II. Known *M. mystacinus* (s.s.) records in Yorkshire

Locality	Grid Ref. No.	Year(s)	Sex	Authority
York	44/6--5--	1898		Grabham O./Stebbings R. E.
Skelton, York	44/56-58-	1968/78	♂♂ & ♀♀	Thompson M.J.A./Corbet G.B.
Thirsk	44/4--8--	1973		Harrison D./Stebbings R. E.
Sprotborough	44/53-02-	1974	♂	Howes C. A.
Loxley Valley	43/2--9--	1976		Whiteley D./Whiteley S. S.
Bransby	44/58-72-	1978	♂ Juv.	Thompson M. J. A.
Warcop, Westmorland	35/763226	1978	♂	Stebbings R. E.

The whiskered bats in the Gordon Collection have not yet been examined closely, and therefore have been included in Table I.

(v) Clarke (1924) — at a field meeting of the Scarborough Field Natural History Society stated 'this is the third occasion in which I have identified this little bat in the Scarborough District'.

(vi) Whiteley and Whiteley (1976) — writing in the *Sorby Record*, state 'the number of recent records suggests that this species is still present in the Sheffield area, and has probably been overlooked'. They also mention that Yalden (1970–73) found both species in old mine shafts and caves in the Peak District of Derbyshire.

(vii) *M. mystacinus* (s.l.) is listed in the general mammal lists in the *Natural History of Scarborough and District* by Walsh and Rimington (1956); also in the *Vertebrate Fauna of Halifax* by Morley (1965) and *Skelton Village* by Stapleton and Thompson (1971). Fig. 2 gives the distribution of positively identified *M. mystacinus* and *M. brandti.*

2. *Habitat and Altitude*

Few authors mention roosts or habitat, but those of interest were from the 'outer walls of old buildings' — Armitage (1901); 'behind shutters' — Grabham (1898); 'bats emerged from old buildings at dusk' — Ingleby (1884); 'I took a specimen from Rockley Abbey' — Armitage (1900); and 'bats emerged from a hollow in a tree' — Booth (1921). Whittaker (1905), removed two whiskered bats from disused tunnels near Barnsley. Sheffield Museum records for 1901 mention that the bats caught at Worsborough were at an altitude of 200 ft, and the Park Head specimen at 650 ft. The bats handled in tunnels at Scordale, near Warcop, were at an altitude of between 1400 and 1500 ft (Stebbings, pers. comm.).

3. *Climatic conditions*

These were only mentioned twice — 'single bat emerged from hibernation in the outer wall of an old building, on a bright warm day in April' — Armitage (1901); 'a single bat fell out of a tree on a hot mid-summer's day at Grassington' — Grabham (1891) and the Cold Hiendley specimen, although no mention was made of the weather, was apparently caught at 'midday on the reservoir' (1915).

4. *Colony size*

Most records are of single bats but two, three or more have been recorded. At Warsill (1884) a colony of 100 was found; 40 at Appleby in Westmorland (1921); 30 at Skelton (1978); 5 at Welwick, near Easington (1898) and 4 at Hornsea Mere (1912). Of these, only the Skelton colony record is dated (viz. early to mid-August), thus it can be assumed that it contained predominantly adult female bats.

5. *Sex*

Early recorders tended not to record the sex of bats, but Booth obtained a single female specimen from Appleby in Westmorland (1912). Some of the *M. mystacinus* (s.l.) skins in

Yorkshire's museums have been sexed (Hazelwood). The Gordon Collection from Duncombe Park contains two males dated 5.6.1926 and 20.4.1935 respectively, and a female dated 1.6.1928. Single male records from York (1973), Wakefield (1974), Sprotborough (1974), and Brandsby (1978) are noted. The Skelton records are dealt with separately.

6. *Forearm measurements*
The *Handbook of British Mammals* gives the forearm lengths as 30 – 37 mm for *M. mystacinus*, and 31 – 38 mm for *M. brandti*, indicating that the latter are slightly larger. According to Stebbings (pers. comm.), male *M. mystacinus* (s.s.) have a maximum forearm of 35.3 mm. Yorkshire specimens, although infrequently measured, have a forearm range between 31.5 – 35.7 mm (n = 7); see Table III.

TABLE III. Known forearm lengths of *M. mystacinus* (s.l.) in Yorkshire

Locality	Year	Forearm length	Sex	Authority
Keighley (Victoria Park)	1908	34.0 mm	♂	Hazelwood E.
Worsborough Reservoir	1901	32.5 mm		No author/Sheffield Museum
Sheffield (Park Head)	1919	31.5 mm		Clegg T. M./Sheffield Museum
Leeds	1972	34.5 mm		No author/Sheffield Museum
York (Rowntree's Factory)	1973	35.0 mm	♂	Thompson M. J. A.
Skelton, York	1973	35.0 mm	♂	Thompson M. J. A.
Skelton, York	1977	35.7 mm	♂	Thompson M. J. A.

The two Skelton specimens were both *M. mystacinus* (s.s.).

M. MYSTACINUS AND *M. BRANDTI* SPECIMEN SKINS IN YORKSHIRE'S MUSEUMS
There are a number of specimen skins in a number of museums around Yorkshire, and these are indicated in Table IV.

The two *M. brandti* specimens, previously thought to be *M. mystacinus*, were identified by Stebbings in 1974. Unfortunately, at the time of writing, both specimens have been mislaid. The Adam Gordon Collection of bats was donated by him to the Yorkshire Museum, York, in 1976. At Bradford, there is evidence of specimens once present from Ben Rhydding dated 1881 and Burley-in-Wharfedale dated 1916.

WHISKERED BAT COLONY *M. MYSTACINUS* IN SKELTON, NEAR YORK
(Grid ref. 44/56-56- and 44/57-56-; altitude 50 ft)
The colony was located by the author in 1968, and has been watched regularly up to the present time. It is situated in a cavity wall at the gable end of the Village Hall, the bats gaining access through a narrow crack between a wooden window frame and the bricks. Exit holes face south-west. The maximum number of bats counted from this colony has been twelve. This roost was abandoned in 1974, but re-located in 1978. A second roost was found behind some warped wooden fascia boards, over the front door of a house built in 1960. This roost faces south-east. The maximum number in the second roost was thirty and it was first located on 1.8.78, but had dispersed by 14.8.78.

Table V gives an analysis of the whiskered bats that have been handled in Skelton since 1968, giving the buildings near to which they have been found.

TABLE IV. Specimen skins of both *M. mystacinus* and *M. brandti* in Yorkshire museums

Museum	Locality	Date	Spec. No.	Authority
A. *M. mystacinus* (s.l.)				
Sheffield	Worsborough Reservoir	24.2.1901	A1905–17	No author
	Sheffield (Park Head)	13.7.1919	1919–2	Clegg T. M.
	Leeds	2.10.72	1972–3	No author
Bradford	Harrogate	1881	31/05	Grainger J.
	Harrogate	1884	31/05	Grainger J.
	Bingley	1889	30/34	Booth H. B.
	Keighley (Victoria Park)	1908	88/41	Hazelwood E.
York	Duncombe Park	5.6.1926	♂	Gordon A.
	Helmsley	1.6.1928	♀	Gordon A.
		20.4.1935	♂	Gordon A.
Hancock Museum	Wassand, Hornsea	27.6.1912		Bolam G./Booth H. B.
B. *M. mystacinus* (s.s.)				
Doncaster	Sprotborough	1974		Howes C. A.
York	York	1898		Grabham O./Stebbings R. E.
C. *M. brandti* (s.s.)				
York	Flaxton	19.8.1896		Grabham O./Stebbings R. E.
	Masham	21.7.1899		Grabham O./Stebbings R. E.

TABLE V. *M. mystacinus* found in Skelton, York, since 1968

Locality	Date(s)	Numbers	Maturity	Weight	Sex
Village Hall	7.68	3 (2 dead)	Juv.		
Village School	8.7.71	2 (1 dead)	Juv.	2 gm	♂ & ♀
Coach House	2.7.72	1	Juv.	4 gm	♀
Village Hall	18.7.72	1 (1 dead)	Juv.	1 gm	♂
Coach House	17.8.73	1	Adult		♂
Pyramid House	9.7.77/78	1	Adult	5 gm	♂
10 The Meadows	18.6.78	1	Adult		♀ (preg)
1 The Vale	5.8.78	2	Adult	7.5 gm	♀ (lact)
			Juv.	5.0 gm	♂

The male caught in 1977 and 1978 was found behind some new guttering, on a newly restored old house. This summer roost, south-west facing, was in regular use. The single pregnant female trapped in 1978 came out of a pipistrelle nursery colony, *P. pipistrellus:* this is an unusual find, as pipistrelles tend to be aggressive and drive out other bats (Stebbings, pers. comm.). No ecto-parasites were found on the two bats handled at The Vale roost on 5.8.78, the juvenile male was carefully examined to differentiate it from *M. brandti.* This colony emerged at 21.15 hours B.S.T.; the weather was overcast with no wind, but there had been heavy rain in the week before trapping.

Most of the juvenile specimens from the Village Hall and School sites were dead, three of them being found on the public footpath next to the Village Hall. The first two specimens were forwarded to the British Museum (Nat. Hist.) for identification.

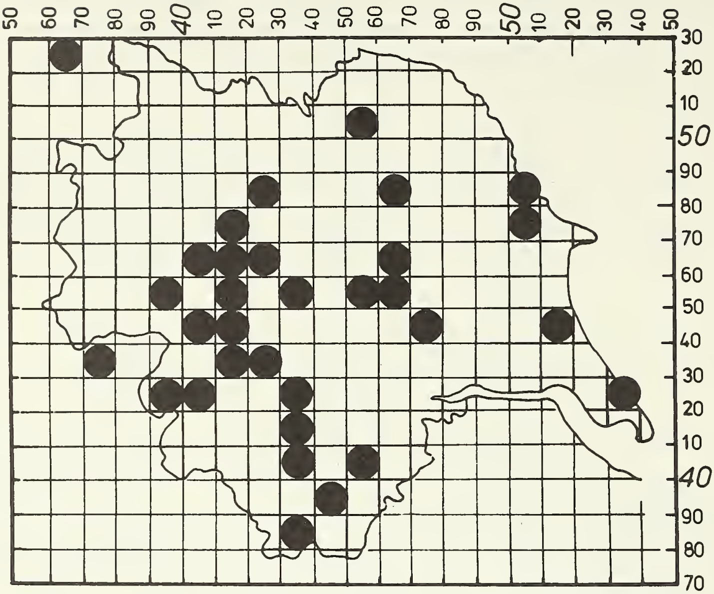

FIGURE 1. *M. mystacinus* s.l. records for Yorkshire 1881–1978

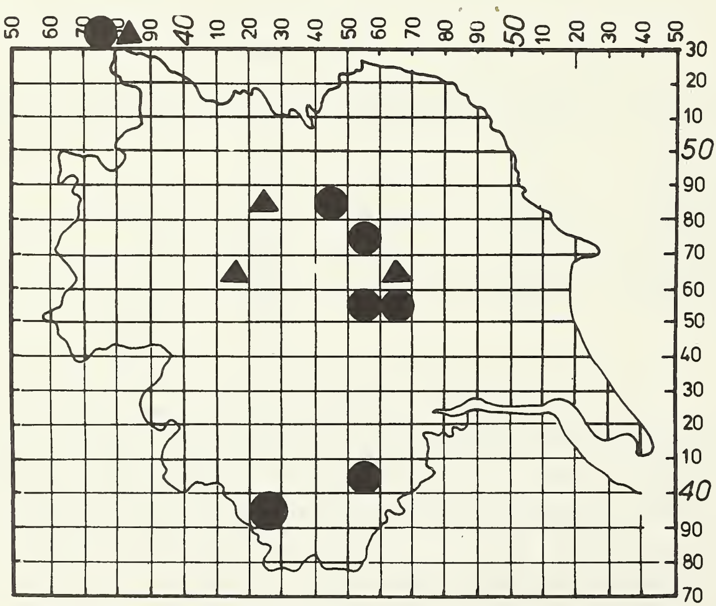

FIGURE 2. Yorkshire records for: ● = *M. mystacinus;* ▲ = *M. brandti*

Status of Brandt's Bat *M. brandti* in Yorkshire

In 1972, Stebbings discovered colonies of *M. brandti* in two adjacent houses at Smelthouses, Pateley Bridge. This find added a new mammal species to the British list, and the Yorkshire list of bat species now totals eleven species. *M. brandti* was new to science in 1970, described from Czechoslovakia and Hungary. In Britain it has been recorded from Devon and Pembrokeshire to Sussex, Suffolk and north to Staffordshire and Yorkshire. Brandt's has been present in Yorkshire for many years; for example, in 1974 Stebbings discovered that two of the supposed *M. mystacinus* skins, collected by Grabham, at the Yorkshire Museum were, in fact, *M. brandti* (see Table VI).

Table VI. Known *M. brandti* (s.s.) records in Yorkshire

Locality	Grid Ref. No.	Date	Sex	Authority
Flaxton	44/6--6--	19.8.1896	♂	Grabham O./Stebbings R. E.
Masham	44/2--8--	21.7.1899	♀	Grabham O./Stebbings R. E.
Pateley Bridge	44/192642	29.7.1972	♀♀ (colonies)	Stebbings R. E.
Warcop, Westmorland	35/763226	9.1.1978	♂	Stebbings R. E.

Of the Pateley Bridge colonies, Stebbings writes that they were in buildings a few yards apart. In the first roost he found a single immature female, one year old, with a forearm measurement of 34.4 mm, and in the second roost two immature females, both one year old, and with forearm measurements of 34.8 and 35.5 mm respectively, and a single juvenile female, with a forearm measurement of 36.2 mm. From one of the bats the flea *Ischnopsylla s. simplex* Rothschild, one male and one female, were removed. It was obvious, according to Stebbings, that there was a breeding colony in one or both sites, although it was possible that the same colony was occupying both roosts. The colony, which had been there for a number of years, had probably declined due to disturbance caused by treatment of woodworm in the roof timbers. The buildings were in a deep-sided sheltered valley by a stream.

M. brandti roosts in trees and buildings in the summer and additionally in caves in the winter. Dentition and penile differences in the male are the clearest diagnostic characters. Adult *M. brandti* have a rich brown pelage, whereas juveniles are greyish and similar to *M. mystacinus.*

Summary

Almost a hundred years of Yorkshire's whiskered bat records are presented, but because of the similarity between the species, the majority of records cannot be assigned to the correct species. 60 per cent of all the records occurred before 1914, 15.5 per cent between 1915 and 1940, and the remainder subsequently. This either shows that Victorian naturalists showed a greater interest in finding and recording bats, or that these mammals are now less common than formerly.

Acknowledgements

I would like to thank Mr Colin Howes, of the Doncaster Museum, who extracted most, if not all, of the records of the whiskered bat from early numbers of *Naturalist.* Without his help this paper would not have been possible. I also wish to thank Dr Robert Stebbings, of Monks Wood, for his criticism and correction of the manuscript and his help with identification problems, as well as providing additional material from his own field work for publication. Finally, my thanks are due to Mrs Elizabeth Sampson for typing the manuscript.

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BOOK REVIEW

The Tropical Rain Forest by **P W Richards**. pp xviii + 450 (incl many text line drawings), plus 4 fold-out drawings and 15 pages of photographic plates. Cambridge University Press. 1979. £9.95 paperback.

A classic in botanical literature — first published in 1952, this remains the definitive work on rain forests. Like the previous four reprints, only minor errors have been corrected and no substantial revision has been attempted. It is a pity the opportunity was not taken this time to provide at least a supplementary list of References, but nevertheless the book still contains a wealth of information at a relatively low price.

SOME LETTERS TO MARGARET STOVIN (1756?–1846), BOTANIST OF CHESTERFIELD

D E ALLEN and DOROTHY W LOUSLEY
Lesney Cottage, Middle Road, Winchester, Hants
14 Javelin Court, Streatham Common N, London SW16

Among the botanical papers left by the late J E Lousley was a packet of thirty-four letters written by various botanists in the years 1820–40 to Margaret Stovin, of Newbold, near Chesterfield. The collection came from a descendant of hers, Lt-Col J B Pennyman of Ormesby Hall, Middlesbrough, who donated it to Lousley in 1954. A handwritten list accompanying the letters shows that they are a mere fragment of a once much larger group.

The recipient was clearly the person whose herbarium of some 2000 sheets, contained in twenty volumes, is now in the Dorman Memorial Museum, Middlesbrough (Kent, 1958). That this found its way there from the same family source is suggested by the fact that, like the letters, it has been wrongly attributed to *Mrs* Margaret Stovin. The 'Mrs', however, was a mere courtesy title, as then customarily conferred on unmarried women of substantial property of maturer years. Failure to realize this has evidently prevented the identification being made with the *Miss* Stovin who features quite widely in the contemporary literature.

Little is known about Miss Stovin beyond a few random scraps of information sufficient to provide a firm starting-point for anyone caring to investigate her more fully. Yet there is a good deal more about her even in print than has been realized, and it has proved possible to produce the following more rounded picture.

From the age given on her death certificate at St Catherine's House — 89 — it can be established that she was born most probably in 1756. Her family was one of some prominence in south Yorkshire and its genealogy has been studied (Clay, 1896). Her father, James Stovin, of Whitgift, near Howden, inherited wealth from his Quaker mother as well as substantial landed property, in Lincolnshire and the West Riding, from a paternal uncle. Her mother, Margaret née Whitaker, was the daughter of a mayor of Doncaster. An unmarried half-sister, Lydia Theodosia, is presumably the Miss Stovin to whom one correspondent (Mrs Reynolds) sends her compliments in two of her letters. A half-brother, General Sir Frederick Stovin, was Groom-in-Waiting to the Queen from 1840 to 1860 and features in the *Dictionary of national biography.* Richard Anthony Markham, who later took the name of Salisbury, the botanist and advocate of the Natural System so bitterly attacked by James Edward Smith and his Linnaean friends, was also of Stovin descent and turns out to have been her second cousin.

It is not clear when or how her interest in botany began. There is a plant specimen of hers in the herbarium of Samuel Hailstone, now in the Yorkshire Museum, dating from as early as 1814. This, and at least one other, were collected at Nocton in Lincolnshire (Wilkinson, 1895–1904), where perhaps the family had property. Bromfield (1845) also records having seen in her herbarium a specimen she had gathered in 1816. By the 1820s, at any rate, as her letters reveal, she had begun to build up a wide circle of botanical correspondents, among them several of the ablest workers of the day, and was active in exchanging specimens and invoking their assistance with determinations. Her letters, indeed, are an interesting record in themselves of one of those 'colliterations' (or correspondence networks) which collectors were forced to cultivate before the founding of the exchange clubs. In her last years, sometime between 1839 and 1842, she was just in time to benefit from one of the first two of these, the Botanical Society of London, to which she contributed specimens on several occasions, as well as donating subscription sets of named exsiccatae.

A find of *Anemone ranunculoides* in the spring of 1840 in a wood near Worksop, far from habitation, raised her hopes (alas, vainly) of having added a new native species to the British flora. Her presentation of a specimen of this from Nottinghamshire is singled out for mention in one of the reports of the Botanical Society's meetings.

About 1844, not long before her death, she found it necessary to change her residence, moving to Ashgate House at Brampton, still in the vicinity of Chesterfield, where she died from an attack of peritonitis, on 16 February 1846.

The letters that follow are those that seem the most interesting historically. All but two of them are from somewhat obscure botanists. The largest single group of letters, nine in all, are in fact from the elder Hooker, before his move from the Chair at Glasgow to become the first Director of the Royal Botanic Gardens, Kew. As an expert on ferns, Miss Stovin's special passion (an unusual one for that period), he was an obvious target for appeals for advice and assistance. Eleven counterpart letters to Hooker, spanning the years 1838–44, are in the archives at Kew — the only letters written by her that we have been able to trace. Like most of those received by her these are largely taken up with botanical minutiae and make uninteresting reading.

Notes on the identity of the correspondents whose letters are reproduced and on persons mentioned in the texts are appended at the end of the paper.

Rainham Rectory
April 8th 1831

Dear Madam,

I take shame to myself when I call to mind that nearly twelve months have elapsed since I received, thro the intercession of my friend Mrs. Campbell, a liberal present of botanic specimens for which I have hitherto made no direct acknowledgment — But, be assured, tho' silent I have not been insensible to the obligation which you have thus conferred upon me; and, tho' thus late in presenting them, I trust you will now accept my best thanks for what will ever hold a conspicuous place in any collection of dried plants which I may hereafter make. Had I not previously imbibed a love for botany I verily believe that your letter along would have excited it. It is unprofitable to read the description of this delightful study, or of the gratification to be derived from it as expressed in that letter, without catching a portion of the spirit of the writer, and feeling, what I hope we may term, a pardonable envy of the happenings or, to express myself more correctly, a laudable ambition of enjoying the same happenings which you have derived from your botanical pursuits: I fully agree with you in thinking 'that a taste for Botany furnishes us with a new sense' and I would add, with a sense which is a medium of imparting only gratification. But I fear, my dear Madam, you will consider that, as a perfect stranger, I am addressing you in far too familiar a strain; and that you may be induced to imagine me as holding a much higher grade among the botanical savants than that which I have attained; for this you might fairly conclude from my venturing to address one who, like yourself, holds a conspicuous place among the learned in this science. This, however, I have been induced to do that I might acknowledge your kindness; and, because, tho' a mere novice, I have always found that kindred feeling existing among those who are attached to Botany which constitutes a sort of fraternity, and speedily renders them known to each other.

As you kindly offered to give me any information which I might require may I request you to inform me what you consider the best guide to the study of the Mosses, and in what manner you preserve them. I saw some which you gave Mrs. Campbell most exquisitely preserved: And having lately failed in my attempts to dry some of this tribe, I shall feel much obliged by information which your knowledge and experience can furnish — Your Desiderata have not been forgotten by me: And tho' I seldom go far from home I shall certainly make an effort to obtain some of them in the course of the Summer; and should I be successful I shall derive much pleasure from forwarding them to you: Indeed I should feel greatly gratified by contributing, even in the slightest degree, to a collection which is (I understand) already one of the finest in the Kingdom.

Believe me
Dear Madam
Yours respectfully
(Sgd) Edward Dewing[1]

April — 1833.

My dear Mrs. Margaret,

Miss Moilliet has been so obliging to send me word that Mr Blair is coming to Newbold and will convey a letter for me. I am glad to avail myself of the opportunity of sending you the promised specimen of *Veronica scutellta* [sic] and also of half an hour's chat as well as a little business with you. — Now I see you opening your eyes at that awful word but do not be alarmed it is only that I am commissioned by my friend Dr Lloyd[2] to enquire the price you fix upon your British Flora which some time ago you mentioned to me that you should wish to part with — when we were at Neach Mill I named it to the Dr who thought he should like to purchase it very much. — We expect the family here early next month by which time I shall hope to have an answer from you — his Herbarium though limited is full of rare specimens (all of which with a few exceptions supplied by Hooker with whom he is in correspondence) of his own gathering — he graduated first at Edinburg [sic] then at Oxford so that he has had rare opportunities. — instead of being placed in a cabinet or portfolios his plants are arranged in cases such as Stationers use to keep their paper in — When opened the top and front fall down and display the edges of the leaves with the class and orders labelled thus [sketch] every sheet is bordered with a narrow strip of pasteboard which keeps all square and firm — This is an exceedingly convenient method — he dries the specimens between sand bags to keep the pressure equal but I cannot say that they are better when finished than yours or mine. — While there I had the pleasure of gathering Thymus Acinos — Conyza squarrosa — Atropa Belldonna [sic] none of which I had ever seen growing before, the latter grew among the ruins of Lilleshall Abbey What a peculiar fancy of the plant to be so fond of church yards and ruins! Yet how consistent with its lurid and melancholy aspect is its habitat! Are you aware that the colour of the red snow at the Poles is caused by a vegetable? If not I have the satisfaction of imparting to you the information that it is tinged with a tiny lichen called Protococcas nivalis — another thing I learned the other day more novel to me than that which is that it has lately been discovered that the danger arising from sleeping in damp beds is because the dampness arises from a vegetable mould — that by sprinkling the bed with water you destroy the plant and prevent the danger — as sleeping between sheets damp only with water will have no pernicious effect — a young travelling friend told me this who had it from Sir Humphrey Davy — Have you seen the sensitive Oxalis? (Oxalis Deppi) — the leaves fall down immediately upon a light stroke from the hand as quickly as the Mimosa folds upwards. it has a rosecoloured bunch of flowers I saw it in the stove at our Botanic garden last Spring . . . Mr Reynolds begs his kind respects to you — please to present my best compts. to Mrs and Miss Stovin and believe me to remain dear Mrs Margt. Your's very sincerely & obliged friend. Eliz.th Reynolds.[3]

Manchester 10th mo 12th 1835

My dear friend
Margaret Stovin

Thy unlooked for & truly acceptable communication was duly received through the medium of our mutual friend Anna Storrs, she having a visitor sojourning with her that is my opposite neighbour & intimate acquaintance.

. . . The Resuming the Pen to an old correspondant is a pleasing Task.

I very much regretted not being at home when Mr. Gisborne[4] called upon me as I have no doubt I should have found him to have been an intelligent Botanist & particularly so as he has studied the more difficult branches of the Science.

I hope to have the looked for pleasure of seeing him on his Return next Month & as I am now giving up travelling I shall stand a better chance of seeing him. = also more opportunities of considering a little more than I have been at liberty to do the various subjects that so materially interest me. = My Botany & Entomology have been almost dormant this year. =

I spent a few hours very pleasantly about a month ago at Settle & I have formed an excellent acquaintance thereby I can procure anything I want that is to be found in that neighbourhood. = I procured the Convallaria Polygonat.^{m} for thee from thence & shall send 3 or 4 spec.$^{ms.}$ = I should much like to have been at Blaize Castle in fact the neighbourhood around Bristol & Clifton affords a rich field for the Botanist. = I was at Bristol some years ago in Winter & even then I rambled amongst the Rocks & could trace the remains of many a dead plant new to me in a living state. = I have only Orobanche major & never saw that growing though it has once been found in our district. = I despair ever rendering thee much service in thy Desiderata seeing them so few & such rare things required but if I can throw in even the "Widows Mite" it will afford me great gratification to do so. = Foreign Ferns are the only Exotics I collect & I have a few tolerably good specimens. = I think I mentioned in a former letter that I have about   Spe.^{ms} of parasitical Fungi & I suppose many of them similar to those sent thee from Oxford; mine were laid down by an indefatigable Botanist of the name of W.^{m} Helme[5] of Preston but now deceased — quite a poor man & a great acquaintance of our late much lamented friend Edward Robson,[6] like him, Helme was a skilfull Botanist & excellent Entomologist. = If thou wouldst like to see them I will cheerfully send them for thy inspection or anything else I have. = Hast thou ever seen the Entomological Magazine? There is a great deal of interesting Matter contained in its various Quarterly Numbers, 13 of which are now out. = I do not think the Ladies like this Science so well as our Sex & perhaps it may arise from a repugnant feeling that they possess lest by chance they should torture the poor creatures that should happen to come under their capture & Investigation. =

The ways & means that an Entomologist possesses readily obviates these objections & no sensible person would unnecessarily inflict a single Pang more than instant death. = We have had some very interesting Lectures delivered by Dr Grant[7] on the Structure & History of the Radiated or Cyclo- Neurose classes of animals. = This is a new field for examination & one in which but little has been done till lately. = I attended one of them on Sponges and was highly gratified but his voice was so low I could not catch all he said though he was extremely eloquent & not a single note to go by. = The Radiata in an anatomical view may be considered as Cryptogamia of Botany. = He borrowed some of my Corals much to the astonishment of many. = He had a large audience at the Mechanics Institution. I have had a Prospectus put into my hands entitled "Lichenographia Britannica" or Collection of Lichens, arranged in Fasciculi, with Descriptions & occasional Remarks by "J Bohler"[8] of Sheffield hast thou seen it or any of the fasciculi? They are published every 2 months 8 Species in each price $^{s}3/6^{d}$. = The prospectus is published for the author by George Ridge, Sheffield. = I name this lest thou should not have seen or heard of it. = I have not added to my Lichens since I last wrote thee. = Nor have I seen any of these now offered.

10 Mo 21 — I was informed by Miss Storrs that a parcel was going to their cousin at Chesterfield in a few days therefore deferred sending thy specimens till this opportunity arrived but to my surprise it is only a very small Bandbox not half long enough for the Desiderata I wish to send, therefore I keep back these till another time. = My collection is so poor that I cannot expect to do much. I can send Potamogeton heterophyllum [sic]
Convallaria polygonatum 4 species
Carex hordeiforme
Equisetum hyemale in fruit
&c and I will try to obtain more 'ere I send them off.

Since writing the part previous to 10 Mo 31 I have seen the fasciculi of Lichens but do not think much of it: price for it is too much although it is upon a nice plan I would rather have more Specimens and no printing. = I am sadly afraid my letter will prove tiresome & unworthy thy acceptance. = I should be truly glad to see thee at Newbold as it would afford me a great Treat, if I ever should chance to visit Chesterfield; I have often threatened to go and perhaps next Spring or Summer may realize my gratification. = Until then

Believe me to be
Thine truly
(Sgd) Joseph Eveleigh[9]

December 1835

My Dear Mrs Margaret

. . . Our friends were very indulgent to our hobbies no grumbling about waiting They never complained of our vagaries but would step out of the carriages to scramble for plants for us — our hosts gun case a capital substitute for a press and I had the housekeeper's room for compression every morning after breakfast to myself — I bought up all the blotting paper in the "Townlet" and came away as rich as Croesus with between thirty and forty new plants — but with all this wealth I can only reckon upon one for you — it is the only one on your list — Rosa systyla [sic] at least so I believe it to be — but the Genus Rosa is so very difficult a one, the species varying so much that one cannot be positive — I put down two specimens however one of which is yours if you like it — I found Apium graveolens growing abundantly in a ditch between North Nibley and Wickwar remote from any dwelling or likelihood of being thrown out of a garden — We visited Bath for two days and Clifton for a few hours not long enough to enjoy the various views but which I shall hope to revisit one day — I was fortunate enough to gather a plant of the Apium petroselinum growing on the hilltop there — which Dr Lloyd pronounces to be a truly wild specimen — I fear you did not meet with that gent.ⁿ at Leamington He resides not far from Dr Jephsons he may catch some "dewdrops from the lion's mane" by his vicinity. It gives me pleasure to hear that you like Leamington as it may induce you soon to visit it again — Please to present my best compliments to Miss Stovin and accept the kind regards of, Dear Mrs Margaret

Yours most sincerely,

Eliz. Reynolds.

May I hope that you will favor me with a letter very soon?

Dec.ʳ 29th 1835.

I did intend to have given you a list of my Glo:shire plants but my paper is done so I must defer it till next letter.

I have ordered Icones Filicum into our Library.

July 25 1836

My dear Mrs Margaret

"A rose by any other name may smell as sweet" but we botanists are compelled to be more strict — and with some degree of humility I confess as in duty bound that my Rosa systila [sic] was no systila but an uncommon variety of canina! prickles very few, small and slightly hooked — flower-stalks solitary — flowers white and small — styles combined though not strictly a column — this being the case I am less disappointed that I could not meet with an opportunity of sending it to you — it delights me to hear that you are as enthusiastic as ever in our own favorite pursuit — for myself I have this Spring become moss mad — the idea of the extreme difficulty of defining the species has always deterred me from commencing the study of this most interesting class of organized beings — having been successful in naming correctly some that grew in my own vicinity I treated myself with Hooker's Muscologia Britannica which lead me on to investigate all that came in my way — I have already obtained thirty species and displayed them on stout wire wove paper that will bear handling — Dr Lloyd who was with us in May happened to bring with him a Drummond's[10] Moss Pocket-Book sent him by Sir W. J. Hooker — the most beautiful thing you ever saw — it is bound in russia leather exactly like an old fashioned pocket book closed with a strap the leaves are ruled in compartments for all the species of British Mosses with the name printed on each — some of these remain to be filled up one specimen only is admitted thus [sketch] I long for one but the price makes me sigh — not that it is dear considering the labour in collecting. Dr Lloyd is now studying the economy of the Pillularia [sic] — he and Dr Conolly[11] of Warwick are endeavouring to form a Natural History Society & I understand go on prosperously. I have got on a little with the genus Rosa this season having found Forsteri and spinossissima [sic] & ascertained bractescens in Notts. where we have not long returned from spending a month. I saw the Ranunculus aquatilis which Smith marks as

variety β growing both in shallow puddles and in clear running water, which induces me to believe that it is not changeable but a true species and so I think is his Var circinnatus [sic] which I have found floating in the Sow in a strong current — shall I reserve some of each for you to examine? — I met with Poterium sanguisorba Trifolium suffocatum Cerastium alpinum and arvense — the Berberis grows there perfectly wild — the gayest of flowers luxuriate on the borders of the little stream at the Manor — the hollow willow trees form natural flower pots where the red Lychnis golden Galium blue Geranium and silvery star flowers have taken the liberty of sowing themselves and making a looking glass of the water. In Lincolnshire (where one of my nieces has married a young Rector) I got Phellandrium peucedanifolium what a splendid plant it is growing! and from the walls of Lincoln Castle Cerastium tetrandrum — on our return while the horses were resting at Nott.hm I walked to Preston in search of the Catchfly which I found there in plenty but was a week or so too late the petals were withered and the fruit forming — I have added Salix glauca and pentandra to the Willows you were so kind to give me How very difficult those Willows are, nearly as bad as Brambles I cannot get on with these last — No sooner do I imagine that I have ascertained one than I am all upset again either by a representation in the supplement or by the specimens in the Bot.l Garden. ever these seem to me as well as Cameron[12] to be getting almost all alike, that is to say fruticosa is the parent of the real stock of two or three others — that are merely varieties. — The Aquatics in the Garden are becoming very interesting & numerous. Isnardia is lately added to them. The Committee are doing all in their power to make the place attractive and popular by the Flower Shows and by having a military band to play there every Tuesday evening when the weather permits they complain of being poor still. Have you read the Memoirs — Corresp of our old friend Sir J E Smith by his lady? I ordered it into our Reading Society and have perused it en passant — not without a feeling of disappointment. I should like to have known something of the domestic habits and familiar conversation of such a man. I do not feel any more intimate with him than before. I know that he was an elegant scholar and must have been a delightful companion, but there are none of those little characteristic touches given which as it were betray the mind without intention — I was very much interested in Davall[13] there is simplicity and feeling in all his letters. Sir Jas. seems to have written with the idea of being printed always before his eyes — Do you know my Lady? Have you seen Watson's Botany Guide? it seems to me only so so, very deficient in Staffordshire Plants at all costs — You do not give your Wrexham correspondent a name but I conclude it is Mr Bowman.[14] I cannot give up my Apium pet.m for truly wild and I see the same habitat is given by other Botanists.

Mr Reynolds begs his best respects to you and writes with me in thanking you for your kind invitation to look in upon you if we should tour into Derbyshire Most assuredly if we ever come near to you (which however at present I do not see any prospect of) I shall have the great pleasure of calling to see you when you have an hour's leisure May I hope that you will favour me with a letter. & now believe me to remain your sincere friend

Eliz.th Reynolds. July 25th '36

Elm Place, New Stretford Road,
Manchester. 26 July 1838.

Dear Madam,

I was glad to be favoured with your obliging letter of the 14th inst. not many days after it was written, though it had travelled the circuitous route, via London, but we are now becoming familiarized to a rapidity of transit, which, but a few years ago would have been believed impossible and unattainable . . .

I feel obliged by your kind expressions connected with my change of residence from a retired and beautiful country, where I had more intercourse with Nature than with Man, and where, had I thought it right to consult inclination only, I would gladly have remained . . .

But do not imagine that we live in the smoke and confinement of the town — nothing but dire necessity could reconcile us to that — we are pleasantly situated about two miles from the centre, and have trees and green fields around us, and generally (being on the S.W. side)

healthy fresh air. And though, on account of the universal cultivation of the soil and the ceaseless and increasing encroachments of commerce, I can find no neighbouring spot where our native plants have been undisturbed; and can make no acquaintance with the plodding race whom I see around me, regardless of everything save "Cotton & Gold", I find exhaustless delight and occupation among my former stores of Plants and Geological Specimens, and among my Books, which embrace the Botanical works from the times of Fuchsius, Matthiolus & Clusius, to those of the present day.

I much regret it is not in my power to serve you with a specimen of Cuscuta Epilinum, which would have given me real pleasure. The fact is, that not being aware of its being new when I gathd. it, I did not bring much away, and the most of what I did collect, was distributed among friends under the name of *C. europaea.* I visited the spot the following season, but saw not a specimen, and for the reason stated in the Magazine, and the probability that it may be found in many other places where flax is grown, was my motive for giving publicity to the notice, to set Botanists upon the scent; and if, from any of their successful labours, your Herbarium should haply be supplied with a specimen, I may be allowed to claim a mite of credit for having indirectly been the means. With respect to the other portions of your Desiderata, they are so few and so rare, that I am unfortunately only able to furnish two, Bromus arvensis, which is common in poor meadows about Gresford, and Lepidium Draba, which I found last summer near Chester. Of course these are not worth sending; but if you have any friend in Manchester to whose care I could confide them for you, I would willingly do so, should you consider them worth writing for . . .

Yours very sincerely,
J. E. Bowman.[14]

Will you excuse me for enquiring if your Herbarium is confined to British Plants? and my reason for asking is, that if you are a collector of Foreign Plants (I do not mean garden specimens) I could point out a mode of procuring a series of native Brazilian specimens, including a large portion of beautiful Ferns, which Sir W. J. Hooker has undertaken the distribution of, & would I know, be happy to supply. They were forwarded to him by W. Gardner,[15] who is still in Brazil, collecting and sending more; and are charged £2. p. every 100 specimens, & a trifle more for freight & duty. I have a full set. Before he left England W. Gardner published a very beautiful collection of British Mosses, gummed down in a Book with Lithographed names, at the rate of 3d. each species, of which I believe a few copies are still in Sir W. J. Hooker's hands.

I have just recd. the first Part of Hooker's "Genera of Ferns", the plates from drawings by the celebrated Bauer. They are magnified views of the Sori, or parts of fructification only, which they admirably illustrate. It will much facilitate the study of the foreign genera of this elegant & lovely tribe.

J.E.B.

My dear Madam,

I have had much pleasure thro' the kind assistance of a valued friend and excellent botanist the Revd. Gerard Smith,[16] in collecting a few specimens of plants for you which I have no doubt will reach you very safely thro' the kind [illegible] of Miss Julia Smith. I shall keep your list of desiderata by me and should I at any time be so fortunate as to meet with more plants that you do not possess I shall very gladly keep them for you, but often I have one specimen only given me of those plants I have not an opportunity of gathering for myself.

My collection of ferns is but small. Perhaps I may some day make out a list of what I want as Miss Smith tells me your collection is very large and beautiful. It is a great pleasure to exchange the plants of different neighbourhoods and to feel that you have the sympathy of those who would otherwise be quite strangers.

Believe me, my dear Madam,
Yours very sincerely,
(Sgd) J. C. Rickman[17]

East Leigh.
March 11th 1839.

Glasgow. Feb. 21 1840.

My dear Madam,

. . . I have often heard of the beauty of your Herbarium & I had once the opportunity of seeing some specimens of your preparing: nothing could be better. I wish I could give you any advice on the subject of the future disposal of so interesting a collection. I cannot foresee what will become of mine, unless it should please God that my son Joseph, now alas! my only one, should return from his long & dangerous expedition & thus I could hope that good use would be made of it. Poor Winch[18] asked my opinion about the disposal of his herbarium, & I gave it to him, though he did not adopt it, partly or wholly because now I believe from a little private pique against that Institution which I thought would value it & care for it as it ought to be cared for. He rejected the advice to give it to the Newcastle Museum & gave it to the Linnaean Soc^{y} where I assured him it would not be so much esteemed. The object should be to see that it goes to a place or an Institution where science & especially Botany is esteemed & cultivated & where there is always some person whose duty & pleasure it is to keep such things in excellent order, & to make them available to students. — This is far from being the case every where. I would as soon commit my Herbarium & Library to the waters of the Clyde as give them to the museum of <u>our College.</u> But it is not so in other places. I was much pleased with the whole collection at Newcastle & very sensible of the great utility it must be to the public. If you have any public institution of the kind in any of the great towns in your part of England, & equally well cared for, <u>then</u> I should say it would be satisfactory to you to have it deposited there & kept by itself (not mixed with other collections), as the "Stovinian Herbarium". In such a way much good may be done by it, & the memory of the Donor venerated for such a gift. I have little knowledge of Derbyshire except from 2 visits I have paid to Chatsworth. Indeed I was there last Autumn & was the first among the visitors when the Duke returned from the Continent. I took Matlock in my way, from the South, & was delighted with the scenery. Mr. Gray has kindly asked me to visit him at his fine old Castle & I wish I could spare the time: & his acquaintance & friendship I esteem. I thought I had a glimpse of him in a distant part of our Church last Sunday week but before I could enquire if it was really he, the almost overwhelming intelligence of the death of my eldest Son[19] in Jamaica arrived: & we are yet sorrowing under this heavy affliction. He was compelled to go on account of a pulmonary attack. He recovered of that almost during the voyage, but in 3 weeks he took yellow fever, accompanied by black vomit & in 9 days was removed from all earthly joys & sorrows. His poor widow, under 19 years of age, is under our roof & is expecting her confinement in a few weeks, — it may occur in a few days . . .

Yours, my dear Madam, with much regard,
(Sgd) W. J. HOOKER[20]

NOTES ON PERSONS REFERRED TO IN THE LETTERS

[1] Rev Edward Dewing (1790?–1840?), Rector of Rainham, Norfolk, 1822–33. Not in the botanical reference works. His son became an authority on East Anglian antiquities.

[2] George Lloyd (1804–89), of Leamington. MD Edinburgh, but of ample means and never practised. His herbarium, mainly formed 1825–43, is now at Kew. There are also many specimens of his in Warwickshire County Museum.

[3] Mrs Elizabeth Reynolds, of The Copse, Birmingham. Not otherwise identified.

[4] Probably John Gisborne (1770–1850), of Wootton Hall and Orgreave Hall, Staffs. Author of treatises on morals. Uncle of Professor C C Babington. Herbarium now at Portsmouth Museum.

[5]William Helme (1785–1834), warper, of Preston. Member of a botanical society there which met at the 'Green Man'.

[6]Edward Robson (1763–1813), of Darlington. Contributor to *English Botany* and describer of *Ribes spicatum.* A collection of his botanical letters is now in Cambridge University Library.

[7]Robert Edmond Grant (1793–1874), first Professor of Comparative Anatomy and Zoology at London University from 1827. A convinced Lamarckian.

[8]John Bohler (1797–1872), of South Wingfield, Derbyshire, stocking weaver and collector of medicinal plants for physicians. His *Lichenes Britannici*, a series of exsiccatae, was issued 1835–37.

[9]Joseph Eveleigh (1786–1838), of Manchester, furrier and silk hat manufacturer. As his style of address indicates, a Quaker. Knew Hooker's parents and an encourager of H C Watson when an articled clerk in Manchester in the early 1820s (Hooker Letters, Kew, 2.182 and 10.133).

[10]Thomas Drummond (1790?–1835), gardener, employed by Hooker to collect in North America for the Glasgow Botanic Garden. Issued fascicles of Scottish mosses (1828) and two series of American mosses (1841).

[11]John Conolly (1794–1866), MD Edinburgh 1821, in medical practice successively in Sussex, Stratford-upon-Avon (of which he was twice mayor) and Warwick, where he resided 1830–38. Subsequently won renown for his progressive methods in treating lunatics. Co-founder of the British Medical Association.

[12]David Cameron (1787?–1848), first Curator of Birmingham Botanic Garden, 1831–47.

[13]Edmund Davall (1763–98), resident in Switzerland and a principal correspondent of James Edward Smith. *Carex davalliana* was named after him.

[14]John Eddowes Bowman (1785–1841), banker, of Wrexham and (from 1837) Manchester. Father of the eminent surgeon Sir William Bowman. An able field botanist of national reputation.

[15]Error for G (George) Gardner (1812–49), student at Glasgow under Hooker. Collected in Brazil, 1836–41, bringing back 7000 species. Issued *Musci Britannici* (exsiccatae) in 1836.

[16]Rev Gerard Edwards Smith (1804–81), one of the best field botanists of the day, though published very little. Held a series of livings round Chichester and, after 1844, in the north. His herbarium is now in the British Museum (Natural History).

[17]Miss Josephina Christiana Rickman (1808–92), latterly of Croydon. Rediscoverer of *Ludwigia palustris* on Petersfield Heath in 1835. Apparently sister-in-law of John Barton, of Chichester, another of G E Smith's botanical friends. Her friendship with Smith is confirmed by a description of a pondweed from the Cam near Cambridge, 1833, over her signature among a collection of drawings recently identified as his in the Dept of Botany, British Museum (Natural History).

[18]Nathaniel John Winch (1768–1838), of Newcastle upon Tyne, author of works on the flora of Northumberland and Durham. His large herbarium was donated by the Linnean Society to the Hancock Museum, Newcastle, in 1803.

[19]William Dawson Hooker (1816–40), MD Glasgow 1839, an ornithologist and entomologist.

[20]William Jackson Hooker (1785–1865), originally of Norwich, appointed Regius Professor of Botany at Glasgow in 1820. Knighted 1836. Director of Kew, 1841–65.

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BOOK REVIEWS

Understanding Genetics by **E B Ford**. pp 201, with diagrams. Faber and Faber. 1979. £7.25.
Professor Ford has produced a guide to the understanding of genetics for 'men of general education and scholars in other fields of learning'. It is a conceptual guide with a wealth of examples of the consequences of genetics and only two paragraphs on the chemistry of genetic material and the nature of coding. This is entirely consistent with the author's aims. Key figures in the development of genetics (Mendel, Bateson, Morgan, Darlington . . .) are noted and their contributions shown in perspective. Prof Ford has lived through the formative years of genetics and cytogenetics, and has a masterly oversight. He can even claim friends in common with Charles Darwin, whose major obstacle could have been removed had Mendel's work been available to him. On the fundamentals of Mendelian genetics the author is clear, but does not always explain that Mendelism is concerned with ratios not numbers: '. . . from this union . . . half the sons but none of the daughters will be colour blind'.

Genetics is concerned with both stability and change — adaptation to existing conditions and evolution; Ford illustrates these matters by reference to polymorphism, evolution in response to pollution, the genetics of cultivated plants, the genetics of ageing, and many more topics. Students of biology and their teachers, for whom the book is not primarily intended, will find much of interest here.

Human blood groups and their genetic basis are explained using Ford's own rational notation; this is valuable background reading for those concerned with the practicalities of transfusion rather than theory. The general treatment of human genetics is compelling reading and should be of interest to all who profess an abhorrence of racialism, or who are inclined to strike political or moral attitudes on the supposed equalities or inequalities of men.

Prof Ford gives advice on smoking, on early detection of cancers and, surprisingly, on camping for biologists. The small size of the book belies the amount of information, and food for thought, which the author's precision of approach and lucid prose have allowed him to include.

I have very few adverse criticisms, and these are trivial: several references in the text (eg Lees, 1974) are not matched in the References, and a very few sentences are unintelligible and should have been corrected in proof. These should in no way deter the intelligent layman or politician from reading or preferably buying this superb book.

DJH

The World of the Changing Coastline by **Jill Eddison**. pp 144, including 26 plates, 17 maps and 19 figures. Faber & Faber. 1979. £4.50.
An introductory book which explains how the features of the coastal landscape of Britain have been formed. Waves, tides, cliff morphology, beaches and longshore drift are all briefly described, and there are useful sections on the vegetation of salt marshes and sand dunes. The volume cites a large number of examples of these features and has excellent maps and illustrations. The coastal features are usefully presented in catalogue form on a county by county basis. It is a work which should add interest to a visit to the seaside, and assist 'A'-level geographers struggling with essays on coastal landforms.

DEC

The Welsh Borders by **Roy Millways** and **Adrian Robinson**. pp 256, incl numerous text illustrations. Eyre Methuen. 1979. £3.95 paperback; also available in hardback.
An excellent account of the topography and historical geography of the fascinating area which lies to the west of the Rivers Dee and Severn, complemented by maps and photographs which effectively capture the flavour of town and country.

Eels by **Ralph Whitlock**, pp 80; **Mosquitoes** by **Anthony Wootton**, pp 72; **Worms** by **Anthony Wootten**, pp 80. Wayside Publishers, Hove. 1979. £3.50 each.
Three volumes in an attractively produced series which will introduce the young naturalist to less obviously appealing, but not necessarily less interesting, groups of animals.

A POSSIBLE OLD-FOREST INSECT FAUNA ON THE OUTSKIRTS OF LEEDS

P SKIDMORE

Generations of entomologists living in most of the larger English cities have long recognized particular local woodlands as supporting notable rare old-forest insects. Thus London collectors have traditionally turned to Epping and Windsor forests, Birmingham workers have visited Wyre Forest, and Manchester men have worked Dunham Park, Chat Moss and Delamere. Sherwood has attracted collectors from Sheffield and Nottingham whilst for the Newcastle upon Tyne entomologist, Gibside or Castle Eden Dene was fairly close at hand. Leeds, however, is unusual in that its entomologists appear not to have recognized any local sites of particular importance in this respect.

Although recent research has cast considerable doubt as to whether the sylvan pedigree of even Sherwood or Windsor Forest can be traced back to the last days of the 'Urwald', the fact remains that most of these famous collecting areas can be identified with one or other of the medieval forests even though continuous tree cover on the precise location in question often cannot be proved. The names of these medieval forests still appear in large print on our maps and indeed two of them abutted the eastern approaches to Leeds, namely the Forests of Elmete and Knaresborough. Have the faunas of these two forests passed without record or does any site exist to this day which supports insects of nationally very local or rare occurrence, whose ancestors inhabited these medieval woods?

In early July 1977 Mrs Dorothy Wall and other members of the Wakefield Naturalists Society were preparing to fight for the protection of Avenue Wood, Temple Newsam. A favourite site with members of that society and with local people who used the wood for recreation, the site was subject to a planning application by the Opencast Executive of the National Coal Board who were proposing to extend their Temple Newsam quarry eastwards, thereby annihilating the wood and surrounding fields. Mrs Wall approached Mr W Bunting of Thorne for help, and he in turn asked me for any published natural history records.

I personally knew nothing of Temple Newsam in early July 1977 and after carrying out a detailed search of the pages of the *Naturalist*, I came to the conclusion that Yorkshire naturalists knew little more, judging from published sources. Nevertheless there were a few records of an entomological nature and these suggested that it could be a noteworthy site. It had long been known as a headquarters of the Large Red-belted Clearwing moth (*Aegeria culiciformis* (L)) in Yorkshire and one or two interesting Diptera were taken there by H M Russell, the most notable being *Chymomyza distincta* Egger. Limited research into the history of the estate indicated that it had been under continual tree cover, at least in part, since medieval times. Hence in its early days the surrounding landscape may well have been dotted with venerable old trees, outliers of the Forest of Elmete. Anyway there was sufficient evidence to plan a brief visit to the threatened site.

On 11 July 1977, in company with Messrs W Bunting and C J Devlin, with Mrs D Wall as guide, I visited the Avenue Wood area of Temple Newsam and was at the outset impressed with the site. Almost immediately I began to find larvae of the spectacular large click beetle *Stenagostus villosus*, an extremely local insect whose only known localities north of the Midlands were in Sherwood Forest and Dunham Park. It seemed remarkable that so large and impressive an insect should have remained undetected so close to Leeds, but of course this species is very seldom seen in the adult state and few coleopterists are familiar with their quarry in their larval stages. Nevertheless the species proved to be quite as numerous in Avenue Wood as I had seen it before, even in Windsor or the New Forest, and remains of dead adults were also found. Indeed one complete dead adult was found in its pupal cell in a rotten birch log lying beside Poverty Spring Lane. To the south of this lane, which skirts the southern edge of Avenue Wood a small valley runs down towards Leverthorpe Hall and a number of stag headed oaks mark its course. These trees were strongly reminiscent of those

in Sherwood, a resemblance heightened by the elders in full bloom growing beside them. Recognizing this as the characteristic habitat of the very local *Aderus oculatus*, another Sherwood and Dunham speciality as far as northern England is concerned, I beat one of the elders. To my astonishment very large numbers of the *Aderus* dropped onto the beating tray along with hoards of *Anaspis*, including the very local *A. luridus*.

I paid two further visits to the wood and adjacent areas during July 1977 and a complete list of species taken was prepared. Mr F A Hunter was also able to visit the grounds of Temple Newsam on two occasions during that period and he considerably extended my lists. Several species found strongly indicate that the site is of great significance as a reservoir of relict old forest insects; the more noteworthy are as follows: Coleoptera — *Euplectus nanus* (Reich), *Stenagostus villosus* (Fourc), *Dorcatoma chrysomelina* Sturm, and *flavicornis* (F), *Anitys rubens* (Hoff), *Hylecoetus dermestoides* (L), *Rhizophagus perforatus* Erichson, *Cerylon histeroides* (F), *Enicmus fungicola* Thom, *Mycetophagus piceus* (F), *Bitoma crenata* (F), *Anaspis lurida* Stephens, *Aderus oculatus* (Pk); Diptera — *Oxycera trilineata* (L), *Pachygaster leachii* Curtis, *Dioctria linearis* (F), *Drapetis pusilla* Loew, *Megamerina dolium* (F), *Aphaniosoma socium* Collin, *Rondania fasciata* (Macq), and *Helina pertusa* (Mg); Hemiptera — *Aradus depressus* (L); Hymenoptera — *Cimbex femorata* (L), and *Callaspidea defonscolombei* Dahlbom. Whilst some of these occur also in other types of situation the inescapable conclusion to be drawn from such an assemblage in a northern woodland in England is that the site is unusually rich in old forest relict species. It can of course be assumed that the rarest and potentially most interesting inhabitants of the site have yet to be discovered for the sample collected resulted from only a very few hours' work.

On 11 July Mr Bunting brought back a fragment of rotten oak stump for further examination. A search of the wood revealed that it was riddled just beneath the bark with Anobiid borings which proved to be the work of *Dorcatoma flavicornis*, some of the beetles still being present along with a few *Mycetophagus piceus* adults and larvae. About a week later Mr Hunter collected a quantity of red rot from inside a long-dead oak stump and found it to contain a vast population of *Dorcatoma chrysomelina.* It was also in this sample that he found a single dead adult of the very scarce *Anitys rubens.* This is a characteristic though rare insect of the main old-forest areas such as Moccas Park, Windsor, Epping, etc, which, interestingly enough was one of the prizes found by Edward Alexander Waterhouse in the grounds of Studley Park during his term of office as Curator of the Earl of Ripon's Museum at Fountains Hall.

Following the initial attack of an oak tree by the Sulphur Bracket fungus *(Polyporus sulphureus)* the dying tree is colonized by a first wave of insects including the Cerambycids *Clytus arietis* (L), and *Leiopus nebulosus* (L), and the Scolytids *Scolytus intricatus* (Ratze) and *Dryocoetus villosus* (F). The fruiting bodies of the fungus presumably attract the beetle *Mycetophagus piceus* which follows the fungus as its mycelia penetrate through the tree, producing the characteristic rot. As the rotting process progresses the Dorcatomines take over, the three species found at Temple Newsam probably favouring slightly different stages of the decaying process. The position of *Aderus oculatus* in this succession is not known but it presumably comes towards the end for it is only known to inhabit large hollow, or partly hollow trees.

Unfortunately it has not been possible to visit the site in question subsequently owing to heavy commitments in other areas. Unfortunately, although the objectors put up a very vigorous and gallant fight for the preservation of Avenue Wood I gather that the Opencast Executive won the support of the Minister in the final assessment. Consequently there is an air of urgency in collecting data about the locality before all is lost without record, and it is to be hoped that collectors living in the Leeds district will concentrate on a more detailed survey during the coming season. Also of course with the benefit of knowledge some salvaging operations may be possible, and indeed even at this late date some more acceptable outcome than total devastation might be possible.

The very small amount of work carried out on the site in question very strongly suggests that there is indeed a relict population of old-forest insects there, perhaps descendants of inhabitants of the medieval Forest of Elmete. The work of Waterhouse in the grounds of

Studley and Fountains Hall, which apparently have never been followed up, suggest that there too there was a stronghold of old-forest beetles when he studied that area during the period 1867 to 1871.

I must first thank those who first brought the Temple Newsam site to my attention, namely Mrs Dorothy Wall, and Messrs Richard Brook and Wm Bunting. Subsequently I was also greatly helped in this work by Miss Sheila Wright, and Messrs C J Devlin, C A Howes, F A Hunter, and G Whalley.

FOOTNOTE (22 JUNE 1979)

On 9 June 1979 in company with Messrs E W Aubrook and J T Burn I paid a return visit to the Avenue Wood area of Temple Newsam and was very saddened to find that the part of the wood bordering Poverty Spring Lane which had supported such a large population of the rare Elaterid *Stenagostus villosus* had been completely destroyed by the Opencast Executive of the National Coal Board in readiness for the planned extension of the quarry. Despite a prolonged search of the many dead birch and beech logs and stumps in the remaining parts of Avenue Wood, some of which looked ideal for the beetle, not a single sign of the species could be found and we were forced to conclude that either the species was absent or that the population density was so low as to elude discovery. My personal view, not shared by others with whom I have discussed this matter was that the warm seasons of 1975–76 may have led to an exceptionally high population of the species at this site. However, as pointed out by critics of this view, *S villosus* spends at least two summers in the larval stage in southern England and perhaps longer at the northern edge of its range. In view of this, and of the fact that not even remains of the insect could be found, the possibility arises that *S villosus* has been wiped out at Temple Newsam. The situation regarding the other rare species taken at Avenue Wood is also uncertain. The site for *Dorcatoma* and *Anitys* was also destroyed but many suitable rotten oaks remain, as do the trees by Leverthorpe Hall which supported masses of *Aderus oculatus*. This species was not seen either on 9 June, but it had almost certainly not started to emerge. On 9 June the only local species seen was a single *Hylecoetus dermestoides* found by my son David, on a dead beech tree.

It remains for others more familiar with the Leeds area to turn up the rare old forest species alluded to in the earlier note elsewhere in the vicinity, assuming that they exist somewhere.

BOOK REVIEWS

A Sketchbook of Birds by **C F Tunnicliffe**, with an introduction by **Ian Niall**. pp 142. Victor Gollancz. 1979. £7.95.
123 coloured illustrations with annotations (mainly of seabirds, waders, ducks, and geese) selected from seventeen sketchbooks, compiled during the period 1934–62, by Charles Tunnicliffe, RA (b 1901–d 1977) the well-known bird artist. Delightful — destined to become a best seller.

Common British Lichens and **Edible and Medicinal Plants** by **Frank S Dobson**, and **Wild Flowers of the Hebrides** by **Roland E Randall**. Jarrold Colour Publications, Norwich. 1979. Each 32 pages and 60p.
Three further titles in this superbly-illustrated series which maintain the high standards we have come to expect from this publisher.

Environmental Impact Assessment. Principles and Procedures. Edited by **R E Munn**. pp xviii + 190. John Wiley. 1979, 2nd ed. £7.50.
Major revision of this useful reference work which first appeared only four years ago. Valuable for decision and policy makers, assessors and advisers concerned with the identification and prediction of a wide variety of impacts on the environment.

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